Transport Canada Transports Canada

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AVIATION SAFETY LETTER

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GUEST EDITORIAL

The *Aviation Safety Letter* (ASL) continues to be an essential vehicle to provide important safety-related information to the civil aviation community. With the advent of the guest-editorial initiative, the ASL has given a voice to key Transport Canada Civil Aviation (TCCA) leaders—leaders who play significant roles in promoting aviation safety in Canada and in leading the change required to allow the industry to continuously improve its safety performance.

In the 40 years since I joined the air force, flying in itself hasn't changed all that much, although advancing technology has made the experience safer and more efficient. The pace of technological change, however, has slowed, and its potential to further dramatically improve safety performance has all but disappeared. The search for ways to improve safety performance has led us down a path away from technical solutions—a path that TCCA took over ten years ago.

In the last ten years, TCCA has been moving toward its vision of an integrated and progressive civil aviation system that promotes a proactive safety culture. While the number of aircraft occurrences is at an all-time low, the aviation industry must continue to strive for the highest level of safety. There will always be risks in aviation, and any lack of attention could quickly reverse this positive trend in safety performance. It is now a question of how we manage risk and what we do to prevent incidents in the first place that is vital and increasingly difficult. Industry growth and globalization have become catalysts to challenge our past practices, providing us with opportunities today to make improvements for the future.

The aviation industry is made up of specialists from various disciplines who rely on each other to make aviation a successful and safe enterprise. Each discipline has a unique and separate culture with unique and separate traditions. In trying to make cultural changes, we recognized the need to better integrate the separate skills and knowledge in order to manage the risks to a far greater extent than ever before. In times of transition, you can choose to lead, or you can choose to follow. On behalf of Canadians, we at TCCA chose to lead the world in adopting safety management systems (SMS) in all areas of aviation activity—a significant and logical step towards improving safety performance by fully engaging all industry participants in turning safety into a value and not just a priority in our day-to-day activities.

Under SMS, aviation organizations are expected to continuously and proactively identify hazards to safe operations and assess and manage the associated risks, never losing sight of the fact that non-compliance with a regulation is, by definition, a hazard to safe operations. Identifying threats to safety before they arise makes good business sense—but it also ultimately saves lives. Recognizing the potential benefits of a risk management-based approach to decision making in the pursuit of organizational excellence, TCCA applied and implemented the principles of SMS to its own organization. We now maintain a systems approach to the management of all risks to our aviation safety program through the Integrated Management System (IMS). In implementing the system, TCCA faces the same challenges as industry in overcoming resistance to change as new processes and procedures are introduced that support a change in culture towards a transparent, risk assessment-based decision-making process.

A decade later, I believe we are entitled to look back on a solid record of achievement. Though the benefits of these systems are not always obvious in everyday operations, I'm confident that we are making significant progress day by day. The level of industry engagement is high, which can largely be attributed to the hard work of inspectors in promoting the importance of SMS. By implementing both SMS and IMS, we are successfully creating a culture where every segment of the aviation community is responsible for aviation safety.

Today we have a robust SMS in place in airline operations and in their maintenance organizations, which means 95 percent of the passenger miles flown by Canadian air operators are subject to SMS regulations. Within the next three years, if not sooner, the navigation service providers and airports will be subject to these new requirements as they go through the implementation phases.

I am proud of what we have achieved together in these last few years. A great deal was expected of the industry and of TCCA employees, and all have risen to the challenge of making the business of flying not only safer than ever before but deserving of the continued public trust in safe air operations in Canada.

Merlin Preuss
Director General
Civil Aviation

Pilots and controllers

This past summer, I was returning to the Victoria, B.C., airport after doing air work in a small Cessna. The air was very choppy, and I was being tossed around quite a bit. I was grateful when I flew over the water of Cowichan Bay where the air was smooth. At 2 500 ft, I reported my position and altitude to the outer tower. The male controller came back immediately, informing me that I had entered the control zone without authorization, and the boundary of the zone was three miles behind me. Using a militaristic tone, he told me to read the Victoria entry in the current *Canada Flight Supplement* (CFS) and to familiarize myself with it. In fact, he talked down to me.

Oops! I'd made a mistake that could have had a serious safety outcome. I should have known better and so offered an apology. The information the controller gave me was informative and invaluable, and I thanked him for it. I was glad he offered it, but he did it on the air. Everyone who was tuned to the outer tower heard him berate me. Perhaps he wanted to teach his lesson to everyone flying at the time. It was like being talked down to by an insensitive teacher in elementary school in front of the class.

My first rule of aviation is to fly the aircraft, a rule carved into my mind for the past 28 years. That is what I did. Since then, I wondered if that controller understood what it is like to approach a busy airport through turbulence. I believe there is a difference between being safely on the ground, talking to pilots, and trying to control an aircraft in turbulence, talking to a controller. I called the tower manager after the incident, and he was sympathetic and said he would speak to the controller involved. Incidentally, several times I had to ask for "say again." I wish controllers would learn to speak more slowly.

Name withheld on request

Interesting discussion, and I want to address this because it deserves to be looked at from both a pilot's and a controller's perspective. I, too, have experienced a "talk-down" from a controller after I had made a mistake, and I understand how unpleasant it is for them and for us. I believe it is appropriate for a controller to point out a mistake right away. On correcting a pilot immediately on the air, controllers rarely have any other option. It is an effective and direct mitigation, despite the fluttered ego. They may occasionally ask a pilot to call the tower after landing, but this is not always practical because of time, because it is too late after the fact, or because the pilot is a transient and just passing through. I will accept a little attitude from an irritated controller if I made a procedural error, and I won't take it personally. If a controller gives me a drubbing on the air, I will learn right away. Even though the Aviation Safety Letter *(ASL) is mailed mostly to pilots and* Aircraft maintenance engineers *(AME), I know that air traffic controllers and flight service specialists read it. I am sure they will relate to your story, too. Finally, I will circulate your letter to the Air Traffic Services—Pilot Communications Working Group as a case study. Thank you again for sharing. —Ed.*

Looking into the *why* of disruptive passenger behaviour

I would like to introduce myself to you as a regular reader of the *Aviation Safety Letter* (ASL). I have read this publication and its previous incarnations since I began flying at Central Airways in 1967.

Over the years, the manner in which the aviation industry looks beyond the obvious for cause and effect of misadventure has been very impressive. Because of this introspection and subsequent innovation, aviation has become quite a predictable event. Simple protocols such as confirmation, identification and crew resource management (CRM), for example, can be implemented into medical and even dental environments that enhance patient safety and improve outcomes. A number of hospitals are consulting with experts in aviation safety and applying that knowledge in their institutions. Physiological limitations are not an exclusive domain to any particular activity.

I can generally count on the ASL and the Transportation Safety Board of Canada (TSB) to delve into problems very thoroughly in order to understand human and mechanical systems, but I found this critical element missing in "Disruptive Passenger Behaviour—Creating a Safer Environment," published in ASL 2/2008.

I cannot agree more that incidents that might threaten the safe progress of a flight must be controlled, but I was quite surprised that no one has thought to analyze *why* these incidents are on the rise. The article to which I refer did not address the *why* of passenger disruptions, but rather how to contain inappropriate behaviour when it manifests itself.

Flying has changed, as we like to say, "since 9/11," and this date has been an excuse for some blatant lack of insight into the human condition. No longer is a critical analysis required; one only need repeat "9/11," and there will be little or no critical response.

Because of "enhanced security," passengers are now told to arrive hours prior to a flight. Once passengers get through the line of checks—security checks and document checks—they are often left to wait in airports that lack any kind of eating facility. And, in the interests of economy, many airlines

no longer provide in-flight meal service. Maybe, just maybe, a number of passengers experience episodes of clinical or subclinical hypoglycemia that can lead to such behaviour. The effects of hypoglycemia are clearly documented in aviation medical circles, and it should not be lost on those who plan security measures that a passenger's body works just like that of a pilot.

I am one who has encouraged smoking cessation long before it was popular to do so. But, like it or not, tobacco products are still being consumed. Some think that tobacco creates a much higher addictive pattern than many narcotics. Several years ago, there was an anecdotal report from a drug addict who confided that kicking heroin was much easier than kicking tobacco. Given the fact that airlines sell tickets to smokers and insist they go smoke free for as long as 24 hours, maybe, just maybe, nicotine withdrawal is affecting their behaviour. Have the airports or airlines considered freely dispensing nicotine patches or gum? It might be a reasonable consideration since we do have expectations of predictable human behaviour on board an aircraft.

As far as security, we have come to equate impudence and random acts of intimidation with enhanced security. Perhaps passengers have been pushed around so much before they even reach an aircraft that, by the time they are seated, they would readily volunteer to act as commandos. Has the industry really done an independent analysis of what constitutes good security? Is there a reason that customs, immigration, and security concerns allow bullies to enter their ranks? It really just takes one or two people with combative and anti-social attitudes to denigrate the security services and initiate a confrontation. A kind word or minor human consideration does not equate to lessened security.

I cannot at all fathom security that involves having your suitcase disassembled in front of one hundred fellow passengers amounting to anything but intimidation and humiliation. Those of us who worked on privacy legislation thought that acts of public humiliation might have been stopped by such law.

I am at a loss to understand why operational flight crews are subjected to shoe inspection—especially when a number of pilots south of the border now carry handguns. I was at a total loss to explain or understand why a security guard felt that hammering a shoe on the floor—after it had undergone visual and radiographic inspection—was a valid security measure.

I am very suspicious that the aviation industry has taken security at face value from consultants "selling security services," and each add-on increases billable services that may have little evidence of efficacy.

The airline industry must realize that passengers are its *raison d'être* and, along with airport operators, ensure that security is not an excuse to abuse the flying public. Until intelligent security and mutual respect are consistently demonstrated to the travelling public, I would suggest we need as much enforcement legislation as possible to ensure a safe flight. After all, if you keep poking any animal with a stick, there is a point at which a response will be generated.

Historically, we have come to expect so much more of the aviation industry in terms of insight, intelligence, and proactive application of knowledge. I would suggest we revisit the airport experience and realize that it may very well affect passenger behaviour.

Richard D. Speers, D.D.S.
Toronto, Ont.

Proposed changes to the CARs in relation to 406 MHz ELTs

As a global aviation safety advisor, a pilot, a private aircraft owner and an aircraft maintenance engineer (AME), I really enjoy the quality and variety of the information provided in the *Aviation Safety Letter* (ASL). Most recently, I have been consumed with the proposed changes to the *Canadian Aviation Regulations* (CARs) in relation to 406 MHz emergency locator transmitters (ELT). I was a respondent to the *Canada Gazette*, Part I, and am opposed to the changes as they are published at this time. Although the comment period is now closed, and we are waiting for news on what changes will make it to the *Canada Gazette*, Part II, I still felt the need to write this morning.

With the latest issue of the ASL came an Important Notice regarding these proposed ELT changes, and in the contents of the ASL, I read with interest the selection of aviation accidents published from the Transportation Safety Board of Canada (TSB). Quite ironically, in all five of the collision with terrain accidents involving aircraft that were required to have ELTs, the ELT signal was not detected because either the ELT disconnected from the antenna (three cases), or the ELT antenna broke (one case), or the ELT was destroyed by fire (one case). While I would love to have the time to review more of these accidents and provide detailed statistics of my own, it would be in vain. The fact remains that no matter how you manipulate the statistics, the failure rate of ELTs is greater than 85 percent due to the design and installation of these units in aircraft. I support COSPAS-SARSAT and Transport Canada in the fact that the position accuracy and signal strength of the 406 MHz ELT is much superior to the old 121.5/243 MHz; however, all of that is moot if the ELT is not able to transmit. Most of the problems reported by these two groups (Transport Canada and COSPAS-SARSAT) were related to the first generation Technical Standard Order (TSO)-C91 series ELTs, and

were improved upon in the second generation TSO-C91a series ELTs. Transport Canada, or more accurately the search and rescue (SAR) industry, has made its decision on the path forward for Canadian aviation stakeholders. The private aircraft owner, which represents over 75 percent of registered aircraft in Canada, has had the smallest voice in the process.

In my profession of advising global mining and petroleum companies on aviation safety, the best practice is to have solid flight-following procedures in place without reliance on ELTs. The most practical and accurate systems on the market at this time are satellite-based tracking units. They provide real-time tracking, with the ability to see a "bread crumb" trail. Even if the aircraft has had to stray from its intended flight path due to weather, its position is always known. For some reason, Transport Canada has drafted the proposed regulations to ensure that these systems cannot be used as an alternate means of compliance. The aviation industry, however, knows the benefits of these systems and continues to equip aircraft at an alarmingly high rate. Technology has come a long way in the last 10 years, and I am sorry to say that ELT design and installations have not. Let's hope that input from the industry can impart changes to the regulation process.

Jeff Goyer
Ardrossan, Alta.

As part of its performance-based regulation, Transport Canada is in fact allowing alternate means of emergency location that would provide "tracking" of aircraft movements. This can actually be found in the proposed regulations as pre-published in the Canada Gazette, *Part I.*

Transport Canada is currently reviewing all comments received further to the Canada Gazette, *Part I consultation and from the public and will consider whether that portion of the regulations needs to be clarified, and the requirements regarding alternate means amended to allow more flexibility for that type of system.*

From the comments received, it was evident that the public did not recognize that the regulations permitted alternate means of emergency location, and that the perception was that only 406 MHz ELTs were mandated.

It is Transport Canada's intention to permit alternate means of emergency location, which could include tracking devices should they meet the requirements set out in the regulations.

Policy and Regulatory Services Branch
Civil Aviation, Transport Canada

GPS contributing factor?

In Issue 1/2008 of the *Aviation Safety Letter* (ASL), the article "Direct VFR Flight in Mountains Results in Another CFIT Accident" does not address one possible critical factor in the accident: the use of a global positioning system (GPS). The reliance on a GPS unit to fly a direct track may have contributed significantly to this tragic controlled-flight-into-terrain (CFIT) event.

I speak from personal knowledge. As a chief flying instructor, I have met a number of pilots who are enamoured with the devices and who claim that a GPS can considerably shorten their trip in mountainous terrain by reducing the navigational workload and allowing them to fly "direct." I always remind them of the importance of not relying solely on the device, making sure to keep their eyes open, and keeping track of their positions along the route on a proper chart.

It is very important for pilots to realize that using a navigation aid as a primary source of navigational information can lead to disastrous consequences. A visual flight rules (VFR) flight must be flown with reference to surface, terrain, ceilings, traffic, and other potential hazards.

I have an ongoing concern that as more and more electronic navigational aids become available at low cost to VFR pilots, fewer and fewer pilots will remember that they have to keep looking outside, and fewer will bother to use maps, let alone current ones. For example, there is a big push by NAV CANADA to see us all install traffic warning systems in our training aircraft. In busy areas such as Toronto, St-Hubert, or the lower mainland of British Columbia, I would expect that these devices would be issuing constant warning alerts on some days and that pilots would simply habituate to warning mode and, thinking they were safe, reduce their vigilance.

I thank you for the efforts that you and your colleagues put forth in producing the ASL.

Name withheld on request

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The Life of a Flight Plan

by the Safety Management Planning and Analysis Division, Operational Support, NAV CANADA

A flight plan (or itinerary) serves two main purposes. First, it provides information to NAV CANADA, which facilitates planning for the provision of air traffic control (ATC) services. Second, and most important, it is the basis on which alerting service is provided to pilots.

A host of air traffic service (ATS) units are involved in the provision of alerting service, including flight service stations (FSS), flight information centres (FIC), control towers, and area control centres (ACC). Community aerodrome radio stations (CARS), which are not ATS units, are also involved in the provision of alerting service.

The transfer of information between these units is seamless to pilots. But to ATS, it is vitally important to know which unit is responsible for providing alerting service at a given point in time. Just as pilots have procedures for the safe transfer of control of the aircraft between crew members ("I have control" or "you have control"), ATS has procedures for ensuring that one unit has responsibility for alerting service.

The purpose of this article is to provide pilots with an overview of what happens to their flight plan at each stage of its life. Understanding how the system works can help pilots make it work better for them![1]

Over the course of its life, a flight plan can be filed, amended, cancelled, activated, changed (IFR vs. VFR), updated, closed, or it can become overdue.

Filed

To facilitate planning by ATS, pilots are requested to file their flight plan at least 30 min prior to their proposed departure time.

Once filed, flight plan messages are transmitted via the aeronautical fixed telecommunications network (AFTN) to units that will be providing advisory, control and alerting services. The AFTN interconnects Canadian ACCs, control towers, FSSs and FICs and other aeronautical facilities around the world.

IFR flight plans are transmitted to the ACC in the flight information region (FIR) where the departure aerodrome is located, so that the ACC can provide control and alerting services. They are then transmitted from one ACC to the next as the flight progresses, and each new ACC assumes responsibility for alerting service.

VFR flight plans are held by the FIC in the area of responsibility where the departure aerodrome is located, so that the FIC can provide alerting service. Then, when activated, they are transmitted to the FIC in the area of responsibility where the destination aerodrome is located. The receiving FIC assumes responsibility for alerting service when the activated flight plan is received.

When filing a flight plan electronically, it is expected that the person filing will be contactable by phone for 30 min after NAV CANADA receives the flight plan, in order to clarify any information.

Amended or cancelled

In Canada, a VFR flight plan is activated automatically at the proposed departure time or actual departure time when reported to an ATS unit, whichever is earlier. To avoid an unnecessary search, it is very important for pilots to notify ATS when their proposed flight is delayed or cancelled. This is particularly true at aerodromes where no ATS or CARS service is provided, as there is no way for ATS to know if the aircraft has departed.

Flight plans filed through a computer system (e.g. NAV CANADA's Internet Flight Planning System, or the Direct User Access Terminal System [DUATS]) can only be cancelled or amended by phone call to or radio contact with an ATS unit.

Activated

As stated above, in Canada, a VFR flight plan is activated automatically at the proposed departure time unless ATS knows that the aircraft has not departed. It is good practice,

1 Pilots should be fully familiar with Section RAC 3.6 of the *Transport Canada Aeronautical Information Manual* (TC AIM), which provides information to pilots with respect to the requirements for flight plans. The information in this article is intended to provide additional information on how flight plan data is handled from an ATS point of view.

however, for VFR pilots to contact the appropriate ATS unit and request that their flight plan be activated. An accurate departure time facilitates planning of ATS and ensures more timely alerting service, if required.

As things work a little bit differently in the U.S., pilots flying VFR from the U.S. to Canada should be aware that they must contact an American automated flight service station (AFSS) to have their flight plan activated.

Federal Aviation Administration (FAA) control towers and air route traffic control centers (ARTCC) do not pass VFR departure times or position reports on to the AFSS. Many VFR pilots have unwittingly violated the *Canadian Aviation Regulations* (CARs) by crossing the border without an active flight plan. In the U.S., filing a VFR flight plan does not mean it has been activated!

Changed (IFR vs. VFR)

ACCs provide alerting services to all IFR aircraft and to the VFR aircraft for which they are responsible. FICs provide alerting services for all other VFR aircraft.

In Canada, when an aircraft "cancels IFR," it means cancelling IFR control service. It does not automatically cancel alerting services. The controller or specialist should inquire whether the pilot also intends to close the flight plan. If so, the pilot will be advised, "alerting services terminated," and the flight plan will be closed.

If the pilot wishes to keep the flight plan (and associated alerting services) open, the ACC will retain alerting services. Pilots should be reminded that an arrival report would then be required to close their flight plan.

In general, when cancelling IFR, it is advisable to keep the flight plan open to take advantage of alerting services—just don't forget to file an arrival report!

This is another example of where things work a little differently in the U.S. If IFR is cancelled in the U.S., or in Canadian airspace delegated to the FAA, alerting service may not follow the pilot into Canada. In such circumstances, the pilot is required to file a new VFR flight plan before crossing the border in order to comply with the regulations and to ensure that alerting service continues to be provided.

Aircraft on composite flight plans (e.g. part VFR, part IFR) have their alerting service managed by different units during the various parts of their flights. The ACC is responsible for the IFR portion, while the FIC is responsible for the VFR portion.

What this means for pilots is that, in circumstances where the flight is terminating with a VFR portion, they should be sure to keep the FIC advised of any delays or revised arrival times. In accordance with VFR procedures, pilots should also be sure to file an arrival report with the appropriate ATS unit.

The above also applies to aircraft flying controlled VFR (CVFR) (VFR in Class B airspace). While a flight plan and departure message is sent to the appropriate ACC to allow control service to be provided, alerting service is provided in the same way as for a VFR flight. This means that updates and arrival reports should be provided to the appropriate ATS unit.

Updated

Since alerting service is based on information provided by the pilot, it is critically important for pilots to keep the ATS unit or CARS up to date regarding changes to their flight plan. Section RAC 3.7 of the *Transport Canada Aeronautical Information Manual* (TC AIM) outlines the specific CARs requirements for updating a flight plan.

Pilots can certainly understand the importance of providing an update whenever there is a change to when, or where, they expect somebody to come looking for them!

Closed

With the exception of pilots arriving IFR at aerodromes served by an ATS unit, pilots are required to file arrival reports in order to close a flight plan. Pilots arriving VFR at aerodromes served by an ATS unit should not assume that their flight plan will be closed. They may request that the unit close their flight plan. Otherwise, a phone call to or radio contact with the FIC at the remote communications outlet (RCO) after landing will save unnecessary search and rescue (SAR) action.

Overdue

The specific time an aircraft becomes overdue will depend on whether the aircraft is IFR or VFR, whether it is on a flight plan or itinerary, and whether a SAR time has been indicated on the flight plan.

If an aircraft is overdue, the responsible ATS unit will initiate alerting service. This process will begin with a communications search—contacting ATS units, aerodromes and CARS along the proposed route of flight to see if they have communicated with the aircraft, and calling the contacts provided on the flight plan. This process will culminate with the notification of the joint rescue coordination centre (JRCC), which will dispatch the appropriate SAR resources.

Conclusion

We hope this article has provided a better understanding of how flight plans make their way through the system. For pilots, the message is simple: ensure your flight plan is complete and up to date and, particularly when flying VFR, ensure your flight plan is activated, updated as required, and closed with ATS! △

COPA Corner: Border-Crossing Procedures Revisited

by John Quarterman, Manager, Member Assistance and Programs, Canadian Owners and Pilots Association (COPA)

Canadians like to travel, and according to Statistics Canada, we like to travel as much to the United States as we do to some provinces in Canada. The number of trips to New York State, for example, is listed on the Statistics Canada Web site as 2 968 000 in 2007, as opposed to some 911 000 trips to Prince Edward Island in 2004 (the most recent statistics available)[1]. The next most popular U.S. destination, Florida, is a close second with 2 485 000 trips, and Washington is third with 1 995 000 trips. Wisconsin (Oshkosh) is not in the top 15 destinations for regular Canadians, but it surely is number one or two for general aviation pilots. In fact, the Experimental Aircraft Association (EAA) regularly announces that Canadians and their aircraft are the number one international visitors to the annual July AirVenture event in Oshkosh. The 2008 data shows that Canadians constituted about one-quarter of all international visitors, and our off-the-cuff estimate is that approximately 1 000 Canadian private aircraft attend each year.[2]

Photo: EAA

The EAA says Canadians and their aircraft are the number one international visitors to the annual July AirVenture event in Oshkosh.

Transport Canada does not report private aircraft general aviation trips to the USA, and statistics were not available from the U.S. Transportation Security Administration (TSA) or NAV CANADA at the time of publication. Nevertheless, it is clear that most Canadian general aviation pilots eventually fly a private aircraft to, or through, the USA at some point in their flying travels. Thus, every pilot should at least have a working knowledge of the procedures and rules for crossing the border. The same is equally true for American pilots entering Canada. The Canada Border Services Agency (CBSA) kindly supplied statistics for aircraft entering Canada from the USA, and the number of private flights is surprising—59 490 in the 12 months preceding May 2008.

Canadian Aviation Regulation (CAR) 602.73 and *U.S. Federal Aviation Regulation* (FAR) 91.707 have for several years (since 1999 and 1996 respectively) mirrored each country's requirement to file a flight plan to cross the border. This requirement applies to flights from and to every airport, aerodrome and farmer's field, including those peculiar examples such as Del Bonita/Whetstone International, Alta., and others such as Coutts/Ross International, Alta., and Dunseith/International Peace Garden, Man., that actually straddle or closely abut the U.S./Canada border. Regional Transport Canada Enforcement and U.S. Federal Aviation Administration (FAA) Flight Standards District Office (FSDO) authorities recently reiterated that no exceptions can be made to this mandatory flight plan rule for any aerodrome, including Del Bonita and others like it. Aviators must file a **flight plan**; flight itineraries are not permissible in either direction.

Since 9/11, homeland security has been a top priority; understanding the border rules and considerations on that side of the border is important before travelling to the USA. On the Canadian side, we too have an increasing concern for security, which has meant some 21st century changes compared to last century's rules. One of the most important changes came about in US NOTAM special notice FDC 2/5319 (www.faa.gov/ats/aat/IFIM/FDC20025319.htm) on Sept 11, 2002, which added two new border-crossing rules to the existing flight plan requirement. These are:

1. The pilot is in communication with the governing ATC facility at the time of the boundary crossing.
2. The aircraft is squawking an air traffic control assigned discrete beacon (transponder) code.

The rules allow for special exceptions, but for this a transponder waiver is required. The waiver can be obtained as a printable form from the following Web site: www.acpa.org/whatsnew/newsitems/2003/tsa_waiver_canada.pdf

Another longstanding requirement is to advise the destination country's customs agency or department when planning to cross the border to land in a private aircraft. This brings us to the subject of ADCUS (advise customs).

1 Source: Statistics Canada Cansim Table based on 1996 census. Table 426-0001: Canadian travel survey, domestic travel, by province and census metropolitan areas, annual (person-trips unless otherwise noted) (156 series). http://cansim2.statcan.ca/cgi-win/cnsmcgi.exe?Lang=E&RootDir=CII/&ResultTemplate=CII/CII_pick&Array_Pick=1&ArrayId=4260001.

2 Source: EAA *Bits and Pieces Newsletter* + COPA estimate

One of the most misunderstood and misused procedures in Canada/U.S. border crossings is ADCUS. This facility had been available for many years as a mechanism to painlessly and easily notify the other country's customs that a private aircraft was incoming across the border. By simply ticking off a check box on the flight plan, pilots could ensure this requirement of prior notice was met.

ADCUS was convenient, but was never 100 percent reliable in either direction. Sometimes flight plans were lost or delayed, and customs failed to be advised in accordance with the regulations. In today's security climate, this failing is not acceptable. It is the pilot's responsibility to ensure that prior notice is given in a timely manner. Given the failings of ADCUS, Canada dropped it for private aircraft flights to Canada some years ago. Today, the CBSA requires that all private aircraft entering Canada preface their trip by a telephone call to the CBSA Telephone Reporting Centre (TRC) at 1-888-226-7277 at least 2 hr, and no more than 48 hr, prior to crossing the border. This is the only practical legal method of returning to Canada. Many American flight service station (FSS) briefers apparently do not know this rule, and every year some Americans fail to comply when they come to Canada in their own private aircraft. Travelling to the USA using the ADCUS procedure to advise the U.S. Customs and Border Protection Agency (CBP) is soon to be discontinued (according to information given to COPA by CBP representatives). While ADCUS may still be legally available at the time of publication, Canadian aircraft should avoid it and instead follow the advice of the *Transport Canada Aeronautical Information Manual* (TC AIM) (TP 14371), which states in part in FAL 2.3.2:

"...ADCUS is still accepted on flight plans to the U.S.; however, the ADCUS remark in the flight plan may not be sufficient notice for some U.S. airports. At least 1 hr advance notice of arrival must be provided. The aircraft operator is solely responsible for ensuring that customs receives the notification. It may be preferable to contact the customs office by telephone to advise them directly of the ETA..."

COPA has strenuously endeavoured to educate members and pilots on both sides of the border that ADCUS is nowadays de-facto inoperable, and at the very least—risky. To enforce this understanding, we have created the "Did You Know" section on our Web site and we regularly give seminars.

U.S. special arrival requirements

Border-crossing punctuality

The CBP expects all pilots to obey a rule requiring the estimated time of arrival (ETA) be accurate within plus or minus 15 min. They may enforce a fine of US$5,000 for any pilot failing to meet this requirement. The COPA border-crossing guide explains that all crossings of the border should be done in short hops to the first available port of entry. This keeps the effect of winds and weather to a manageable risk, and allows the aircraft to return to Canada if the ETA in the USA is missed. (The CBP US$5,000 fine for missing the ETA by more than 15 min does not apply if the aircraft does not land.)

CBP 178 form

The CBP expects pilots to print and fill out the Private Aircraft Enforcement System Arrival Report form (CBP 178) to enter the USA. The form can be found at http://forms.cbp.gov/pdf/CBP_Form_178.pdf. Some ports prefer that pilots fax this form ahead of time. Regardless, this form should be completed in advance and handed to the CBP on arrival. (Note: CBP 178 is being phased out by the implementation of the *Electronic Advance Passenger Information System* [eAPIS], which is discussed further below).

New border-crossing rules anticipated

Rules are constantly changing as security issues dictate. The CBP released a final rule, effective December 18, 2008, which requires pilots to complete and submit a detailed electronic passenger manifest using eAPIS, a web-portal to enter the data and receive an e-mail confirmation. Although this rule is now in effect, the CBP will not enforce the rule and penalize pilots until **May 18, 2009**.

Effective May 18, 2009, CBP will enforce the new rule, and pilots must submit their manifest to CBP through eAPIS prior to their flight. eAPIS collects manifest information for travel in and out of the USA and replaces form CBP 178. We strongly recommend that you go to https://eapis.cbp.dhs.gov/ and take the eAPIS online tutorial. **The penalty (on a first offence) for failing to file the eAPIS manifest after May 18, 2009, is a US$5,000 fine against the pilot-in-command.**

Other future security requirements for aircraft over 12 500 lbs are presently being discussed on both sides of the border by each country's security agencies.

CBP decal

The CBP requires all private aircraft to carry a customs decal to enter the USA. This decal, which is renewed annually, is usually affixed to the doorpost on the pilot's side of the aircraft, and according to the CBP:

"The user fee decal for private aircraft and private vessels is to be affixed on the outside of the conveyance within 18 in. of the normal boarding area, where it is visible when doors/hatches are open."

Decals may be ordered from: www.cbp.gov/xp/cgov/travel/pleasure_boats/user_fee/user_fee_decal.xml and cost US$27.50 (2008 price). Do not assume decals can be bought from the inspectors; check with the port of entry first.

Radiation screening

Since February 2008, customs personnel have been using a handheld screening device to screen all aircraft entering the USA for nuclear hazards. The passengers and pilot are screened as well. Items that may cause concern are very old aircraft instruments that use radium for dial illumination and recent nuclear medicine tests given to the pilot or passengers. Prior notice must be given to the CBP if these specific or other radiation sources are on board the aircraft.

Washington DC air defence identification zone (ADIZ)

All pilots transiting or operating into or out of the Washington DC ADIZ in the new year (starting February 9, 2009) must have taken and passed an FAA on-line test (in accordance with FAR 91.161), which is available at: https://www.faasafety.gov/login/reg/Register.aspx. The course is described below:

Navigating the New DC ADIZ

This course explains the requirements and procedures for operating in the reconfigured Washington DC Air Defense Identification Zone (DC ADIZ). Successful completion satisfies the regulatory requirement mandated by 14 CFR Part 91.161, "Special Awareness" training for any pilot who flies under VFR within a 60 nautical mile radius of the DCA VOR.

This requirement applies to all foreign pilots, including Canadians, as well as American pilots. COPA has requested, through TC, that the FAA make this on-line course and test accessible to all Canadians with Canadian addresses (it currently requires a U.S. zip code be entered). In the meantime, TC has explained that the FAA requests that foreign pilots select "non Airman" as the licence classification and use the zip code 33811. This issue should hopefully be fixed by the time this article goes to press.

Staying aware of border-crossing rules and future changes

COPA prides itself on its track record of educating Canadian pilots about the border and the safe and legal way to cross it. In addition to providing free advice and resources to visiting American pilots, COPA maintains member-access resources and a 153-page guide to cross-border operations for crossing the U.S./Canada border and for flying in the United States. COPA strongly suggests that Canadian recreational pilots regularly review the latest material in this guide, as it is constantly updated when new information becomes available. For further information on this topic, contact John Quarterman at JohnQPublic@rogers.com, or consult the relevant border-crossing material available from the members-only section of the COPA Web site at www.copanational.org. △

The HAC Column: The Emerging Duty of Care for Helicopter Operators

by Fred Jones, President and Chief Executive Officer, Helicopter Association of Canada (HAC)

It used to be that air operators could proudly proclaim to the world, "We are in full compliance with Transport Canada regulations." What is emerging in the aviation community is a standard that supersedes strict regulatory compliance and extends that responsibility to include industry best practices—what the legal community refers to as *due diligence*. In other words, what would a prudent operator do under similar circumstances? What are industry best practices in this type of operation? How do other operators deal with these risks?

In many sectors of the aviation community, customers recognize the inadequacy of regulations that prescribe every type of activity. Customers are incorporating special requirements into the terms of contracts with operators that may include special flight crew, operational and even maintenance requirements. In fact, they are enlisting the support of independent third-party auditors to examine operations and ensure that operators live up to those requirements—whether the operator believes they are reasonable or not.

The question for the operational community is, "Who is in the best position to establish an *industry standard*?" We all know that industry safety standards and norms evolve with time, and so does the due diligence standard. We have all seen the movement toward a higher level of personal protective equipment for employees, for example, and an analysis of the risks they are exposed to in the work environment. The due diligence standard for any type of operation should be developed and agreed upon by a representative sample of operators who are actively engaged in the operation under discussion. Only then can we claim that the standard is truly representative. Only then can it be promoted by the industry segment to its customers and to the regulator.

The cornerstones of any industry best practice are experience and the collection and sharing of safety information—*the good, the bad, and the ugly*—not only within your own company, but also between companies and between industry stakeholders in an open non-punitive forum. A number of our committees at the Helicopter Association of Canada are actively engaged in this discussion, and we believe that it is the key to industry-driven safety enhancements *and* greater efficiency. I challenge you, as helicopter operators and stakeholders in the larger aviation community, to engage with us as we move forward to develop these standards. △

CBAA Column: How Safety Management Systems Apply to the Small Operator

by Tim Weynerowski, Certification Specialist, Canadian Business Aviation Association (CBAA)

Some smaller operators may view a safety management system (SMS) as an unnecessary hurdle designed to manage the complexities of a larger organization. In reality, an SMS is an effective risk mitigation tool applicable to all sizes of organizations. What varies between small and large organizations is the level of complexity of the SMS. What remains the same is what's at stake.

Whether a large operation or simply an owner/operator running a one-man show, the need to take a comprehensive look at potential hazards and associated risks is not something that should be taken lightly. Technical, environmental, and human factors are just a few of the areas that require consideration. Due to the unique nature of each operation, modeling policies and procedures after another organization simply to expedite the process is unwise, and is not a good demonstration of due diligence. What may be suitable for one organization may not be appropriate for another.

Being able to recognize the value of an SMS is essential. This may be difficult for some new operators who are intent on getting their recently acquired aircraft in the sky quickly. Ironically, the most resistance to SMS often comes from small operators—potentially the highest risk group.

An example is a private owner/operator who has upgraded to an entry level turbine-powered, pressurized aircraft and is suddenly faced with the challenges of adhering to a new and more complex set of standards. The operator must establish an organization, incorporating systems and processes that were not previously required. SMS training is useful in the development of a sound and effective operation and may help the operator generate the enthusiasm and appreciate the value of engaging in the creation of a performance-based SMS.

An important part of risk mitigation involves good planning, such as setting operational limitations built around industry best practices. Although some areas of concern (such as fatigue management) have prescribed standards, other issues (such as the compound effect of pushing multiple flight limitations to their limit) require careful consideration. Well-developed policies and procedures built around a strong safety culture are essential in maintaining acceptable levels of risk. Outside pressures can obscure good judgment and may be mitigated by establishing thresholds that require deviation to pre-established contingency plans. Arriving late—but alive—is always better than not arriving at all.

For an SMS to be effective, periodic re-evaluation of the system is a must. Some small operators feel this process is onerous and unnecessary due to the simplistic nature of their operation. However, taking the time to examine what is working well and what is problematic enhances the operator's situational awareness and helps to keep flight operations safe and enjoyable. △

Night Fright

by Garth Wallace

Melville Passmore was a private pilot working on a night rating. The lack of a written test on the course appealed to the young farm boy. He was slow on book learning, but good at things practical.

The school's Piper Cherokee 140s were stable platforms for instrument training. Melville handled that part of the course well. He was steady on the controls and had good hand/eye coordination.

The Cherokees sank more rapidly than most light planes on the approach. It could be difficult to land them at night smoothly, especially with power off, but Melville was soon greasing the airplane on. It didn't matter if the landing light was on or off or the flaps were up or down, he nailed each touch-and-go.

The farmer-student was soon ready for the last dual lesson on the night rating course: the cross-country flight. I already knew that he could navigate at night on local lessons, so my challenge was to find something useful to do with him. He always needed radio work, so I planned to fly from our base in Southwestern Ontario, through the Toronto terminal control area (TCA) to the Toronto City Centre Airport, and back. That would give him lots of communication practice.

"When we go to Toronto," he asked excitedly, "will I be talking to the same controllers as the airline pilots?"

"Yes, you will."

"Do I call them 'sir'?"

"No, you talk to them just like you're an airline pilot."

"Wow!"

Melville's problem on the radio was he needed a wind-up before saying anything into the microphone. Each time he keyed the mic, he took a deep breath, licked his lips, pulled in his tongue, looked both ways and then spoke. The dead airtime was okay at our local airport; the controllers knew his voice and would wait through his pauses.

I wrote down everything that I thought Melville would need to say and what he should hear in response when talking to the Toronto controllers. We practised on the ground before the trip. Melville read his part and I played the air traffic controller.

We reviewed the script on the evening of our flight and filed a round-robin flight plan to Toronto City Centre. Melville checked his equipment: two flashlights, two pencils, a map, a kneeboard and the script. We did the pre-flight inspection together and climbed in.

Melville went through the checklist, started the engine and picked up the microphone for taxi instructions. He keyed the mic, took a deep breath, looked both ways, licked his lips, pulled in his tongue and spoke from his boots, "Ground control, this is Cherokee Lima Oscar Whiskey November?"

"Hi, Melville," the local controller replied. "I see you're on a flight plan to Toronto. Taxi for Runway 24, wind calm, altimeter 30.03. Call me on the tower frequency when you're ready to take off."

So much for radio procedure training.

"Okay, thanks," Melville replied. Then he saw my frown. "I mean, Oscar Whiskey November, roger."

We took off and headed for Toronto. The controller bid us a "good flight" when we cleared his zone. It was a calm, clear night. We cruised at 3 500 ft. Melville eagerly followed along the map with a stubby finger identifying each group of lights below. He selected the frequency for the tape-recorded terminal information service as we approached Toronto, and printed the numbers on his kneeboard. Then he changed to Toronto terminal control. It was busy.

"Air Canada now cleared to twelve thousand, break, break, United turn right to zero six zero."

The controller was working both IFR and VFR traffic around Toronto. We couldn't hear the airline replies on the IFR frequencies.

"Delta over to the tower now, one eighteen four.

"12 Bravo Charlie, one more turn for the localizer, keep your speed up, there's a 747 behind you."

The radio work was rapid and continuous. I looked at Melville. His eyes were wide.

"You just have to jump in when he's not talking, Melville," I said. "He can listen to two pilots at once. Just say exactly what we practised. Start with initial contact."

He stared at his kneeboard, keyed the microphone, took a deep breath, licked his lips, pulled in his tongue, looked both ways and spoke, "Toronto terminal, this is Cherokee Lima Oscar Whiskey November?" He said it as a question. He looked at me; I nodded; he released the mic button.

"West Jet, radar contact, now cleared to 12 000."

Melville gave me a blank stare. The tongue was at full hang.

"Just wait, if he heard you, he'll call back."

"Tango Charlie Golf over to City Centre tower now."

"Tango Charlie Golf."

"Is that Lima Oscar Whiskey November calling VFR?"

Melville looked at me and did nothing.

"Say 'affirmative'," I said.

He pushed the mic button, breathed in, licked his lips, pulled in his tongue, looked around and said, "Affirmative."

"Air Transat, cleared to flight level two five zero, contact centre now."

Melville gave me a deer-in-the-headlights look.

"He'll call you, just wait."

"12 Bravo Charlie, right turn to 200 degrees to intercept the localizer for 24 Right, you're cleared for the approach.

"Lima Oscar Whiskey November," the controller said, "squawk ident."

Melville was paralyzed. I pushed the identification button on the transponder.

"British Airways, radar contact. You're number two for 24 Right behind a King Air intercepting the localizer."

"Radar contact Oscar Whiskey November. Are you going City Centre?

"Say 'affirmative'."

Mic on, breath in, lick lips, tongue in, look and, "Affirmative."

"Down to 2 000, Oscar Whiskey November, stay along the lakeshore and call me by the four stacks. Do you know where that is?"

Melville looked down at the now unnecessary script and then at me.

"Say 'affirmative'."

He keyed the microphone, took a breath, pulled his tongue in—without licking his lips—looked around and spoke, "Affirmative."

That was progress, I said to myself.

Melville continued to hold the microphone in front of his face.

"What did he ask you to do, Melville?"

"Descend to 2 000?"

"That's correct and stay along the lakeshore, so hang up the mic, start down, find the four stacks landmark on your map and navigate to it."

He did.

The terminal controller called us before Melville could call him.

"Oscar Whiskey November, you are coming up to the four stacks. Over to City Centre tower now."

I pointed to the reply on the radio script. Melville keyed the microphone, took a breath, pulled his tongue in and spoke, "Oscar Whiskey November."

He looked at me; I nodded; he released the transmit button.

"OK, continue on the list."

Melville got to work. He wrote down the numbers from the City Centre automatic terminal information service (ATIS), changed to the tower frequency, picked up the microphone and looked at me. There was no traffic on the radio. I nodded.

Mic on, breath in, tongue in, "City Centre, this is Cherokee Lima Oscar Whiskey November?"

"Cherokee Lima Oscar Whiskey November, City Centre."

Melville looked down at his kneeboard where his finger marked the next line. "Ah, Oscar Whiskey November by the four stacks at 2 000 with information Papa, VFR from Homestead, landing City Centre." He released the mic button without looking for a nod from me.

"Oscar Whiskey November cleared to the left downwind Runway 26, wind 240 at five, call established."

Breath, tongue, mic on, "Oscar Whiskey November."

I gave him a thumbs-up.

Melville was doing well. There had been less radio work than I had anticipated, but there would be more on the return flight.

A moment later, the lights in the cockpit went out. I could feel Melville staring at me in the dark. I was staring back.

"Where's your flashlight, Melville?"

He dug in the map pocket on his side of the airplane. I took the microphone from him, punched the transmit button and released. There was no "click" sound on the radio. I checked the squelch: nothing. The engine continued to buzz along. The landing light had stopped working. We had lost our electrical system.

Communicating at night isn't that much different than during the day—it's only a different environment.

Melville turned on his flashlight.

"Shine it on the engine instruments," I said.

He did. The alternator output gauge read zero. So did the fuel quantity gauges in the same instrument cluster.

"We're out of gas?" Melville asked. There was more doubt than panic in his voice.

The fuel gauges were electric. Having no electrics over downtown Toronto at night was bad, but not life threatening. I was determined to make it a learning experience for Melville.

"What should we do?" I asked.

"Declare an emergency?"

"Were the tanks full before we took off?"

"Yes."

"Is the engine running?"

"Yes."

"Are we out of gas?"

He scratched his head. "No."

"What drives the fuel gauges?"

He shone the light on them. "Electricity?" He looked at the panel again. "The alternator isn't working?"

"What should we do?" I asked.

"Inform ATC and land as soon as possible."

"Does our radio work?"

Melville turned the squelch knob up on the radio. There was no background noise.

"No."

"Now what?"

"Squawk 7600 on the transponder and land at the nearest suitable airport?"

"Go ahead. I'll fly the airplane."

I took over control. While talking, we had been flying along the lakeshore. The City Centre Airport was less than five miles ahead. I could see one red navigation light moving on a base leg for Runway 26. I set up a descent.

Melville shone his light on the radar transponder and gingerly tuned it to 7600.

"Does it work?" I asked.

There were no flashes indicating interrogation. He turned the transponder selector to test. The light didn't come on.

"No."

He scratched his head again. "If the alternator is off, all the electrics are dead?"

"Now you're getting warm," I said. "What about the battery?"

"It should carry some electrics for a while."

"But it didn't. What should we do?"

While Melville thought, I joined the left downwind leg of the circuit. The other aircraft was touching down. The bright lights of the high-rise office towers loomed on our left, while the cold, black nothingness of Lake Ontario stretched out to our right.

"We should land as soon as possible?" Melville asked.

"How would we get a landing clearance?"

He suddenly turned and looked down at the control tower.

"Hey, they're shining a green light at us!"

"What does that mean?"

"Ah, we're cleared to land?"

"That's correct. You have control."

He landed. It was a good one. The steady green from the tower began flashing. We were cleared to taxi to the ramp.

I began thinking about how we were going to get home.

Melville parked the Cherokee and shut down the engine.

"That was kind of neat," he exclaimed. "How did you arrange it?"

Garth Wallace is a former flying instructor who lives near Ottawa, Ont. He has written eleven aviation books published by Happy Landings (www.happylandings.com). The latest is The Smile High Club. *He can be contacted via e-mail: garth@happylandings.com.* △

2008 David Charles Abramson Memorial (DCAM) Flight Instructor Safety Award

The recipient of the 2008 DCAM Flight Instructor Safety Award is Robert (Bob) Henderson, Director of Flight Operations and Chief Flight Instructor at the Moncton Flight College (MFC) in Moncton, N.B. The award was presented to Bob on November 11, 2008, by Jane and Rikki Abramson at the Air Transport Association of Canada (ATAC) Annual General Meeting and Tradeshow in Calgary, Alberta.

Left to right: Jane Abramson; Bob Henderson; Rikki Abramson; Mike Doiron, Chairman, Board of Directors, ATAC, and Principal and CEO, MFC

Bob successfully manages some 500 student-pilots in four different programs. Over the last several years, he has worked on a variety of flight training projects with Transport Canada, the Civil Aviation Authority of China, and the European Joint Aviation Authorities (EASA) Training Office. Recognized as a methodical individual and also a great mentor, Bob is dedicated to his chosen career and demonstrates a very strong work ethic. These qualities, among many others, make him a worthy recipient of this valued award.

The annual DCAM Award promotes flight safety by recognizing exceptional flight instructors in Canada and has brought much recognition and awareness to the flight instructor community. Recognition of excellence within this segment of our industry upholds a safety consciousness that will hopefully be passed on for many years to come.

The deadline for nominations for the 2009 award is September 14, 2009. For details, please visit www.dcamaward.com.

BLACKFLY AIR

Well! There she is, Randy! Our brand new barn for what's to come . . . you know the way that Ma is turning us into the next big thing.
Real nice and roomy, Mr. Black, but there's still a lot to do safetywise in this empty shell.
What do you mean safetywise? It's got a top-of-the-line heating system and automatic doors. What else do you want?
Well, here's a Hangar-101 safety-items checklist I got from my last gig. Sorry, but an earplug bin alone just won't cut it.
Why so many buckets and goggles? And what's this emergency eyewash station? We got a lake right here!
Good one, Mr. Black! Our new birds will love this nest, but not until we complete the checklist!

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Changes in the Way Pilot Proficiency Checks Are Conducted in the Commercial World

by Wayne Chapin, Civil Aviation Safety Inspector, Chief, Certification and Operational Standards, Standards, Civil Aviation, Transport Canada

Last year alone, there were over 14 700 pilot proficiency checks (PPC) conducted on pilots who fly for commercial air operators in Canada. Transport Canada Civil Aviation (TCCA) inspectors cannot conduct every PPC. For many years, TCCA has delegated the authority to conduct check rides to industry pilots who have met specific requirements in experience, knowledge, and skill. The Approved Check Pilot (ACP) Program oversees the competencies of ACPs and pilots operating under Part VII of the *Canadian Aviation Regulations* (CARs). Recently, policy changes to this program have been developed that place increased checking activity in the hands of ACPs. These changes have been ongoing since 2004, and should have been transparent to you, the pilot-candidate.

These days, you are more likely to see an inspector in the back of the aircraft flight deck (or simulator) watching an ACP conduct your PPC than you are to have an inspector conduct a check ride on you.

To become an ACP, a pilot must meet general and practical training requirements, and demonstrate knowledge and skill in conducting a check ride. At least once a year, TCCA conducts a quality assurance review of an ACP; an inspector will conduct a check ride on the ACP during an actual PPC ride. These days, you are more likely to see an inspector in the back of the aircraft flight deck (or simulator) watching an ACP conduct your PPC than you are to have an inspector conduct a check ride on you. The inspector is there to evaluate the ACP's performance. Except for the additional person on board the aircraft or in the simulator, there should be no difference in how the PPC is conducted.

TCCA is continuously striving to improve the ACP program by educating the ACP community and exploring better checking techniques. In the last five years, the rating scale changed to a more discriminating 4-point scale, the evaluation of crew resource management (CRM) skills has become an essential element of every test exercise, and overall weak performance can now result in a failed PPC. The next challenge will be to incorporate the Threat and Error Management model in the evaluation process as it has the potential to radically change conventional thinking on the individual's proficiency and/or the crew's ability to manage a flight.

If you are curious about the standards used to conduct a PPC, or wish to learn more about becoming an ACP, you can consult the ninth edition of the *Approved Check Pilot Manual* (TP 6533), which details all ACP requirements. In addition, the *Pilot Proficiency Check and Aircraft Type Rating Flight Test Guide (Aeroplane)* (TP 14727) and the *Pilot Proficiency Check and Aircraft Type Rating Flight Test Guide (Helicopter)* (TP 14728) may interest pilots who would like more information on the PPC. These publications are available at www.tc.gc.ca/CivilAviation/commerce/OperationalStandards/acp/menu.htm. The guides cover items such as admission requirements to the PPC, flight crew concept, single-pilot IFR requirements, CRM, and the 4-point marking scale. They also provide a detailed list of the flight-test exercises as well as an explanation of your rights, should you fail a check ride. △

Cabin Safety: Spreading the Word on Aviation Child Restraints

by Erin Johnson, Cabin Safety Project Officer, Cabin Safety Standards, Standards, Civil Aviation, Transport Canada

Whether you are a passenger, crew member or pilot, you may be able to appreciate that travelling with a child can be a daunting experience. Along with concerns over the safety of your child, there are a number of things to consider, such as what to pack and how to keep a child entertained and occupied during flight. Another common concern, and the focus of this article, involves the use of child restraint systems. Questions about age limits, certification, installation and stowage of child restraint systems are often forwarded to Transport Canada.

Use of child restraints for flight is a very important issue to Transport Canada Civil Aviation (TCCA) and to the aviation industry as a whole. The issue has also been a very difficult one at that. Because aircraft seats are designed differently than car seats, not all car seats are compatible in design and function for use on airplanes. There are therefore many operational difficulties associated with the use of car seats on aircraft. As a result, the rules for the use of car seats on airplanes differ. While most parents would never dream of travelling by motor vehicle without their child strapped securely into a car seat, use of child restraints is currently not mandatory under the *Canadian Aviation Regulations* (CARs). According to the Regulations, children under the age of two may be held securely in the arms of an adult during flight. Nonetheless, Transport Canada highly recommends the use of an approved child restraint for all phases of flight, as such a system provides the greatest degree of protection for the infant or child and will help in unanticipated turbulence.

Types of child restraints and labelling requirements

There are a number of child restraint devices currently on the market; however, not all are permitted for use on board aircraft. An approved child restraint system is one that meets the *Canadian Motor Vehicle Safety Standard* (CMVSS) 213 or 213.1. To be accepted for use on board the aircraft, the restraint system must bear a Statement of Compliance Label indicating compliance with CMVSS 213 or 213.1.

Types of child restraint systems that may be accepted on aircraft include infant restraint systems, child restraint systems, convertible restraint systems and combination systems.

An **infant restraint system** is an aft-facing restraint system that is generally restricted to an occupant weight of less than 20 lbs. Weight restrictions are specified on the system and can vary from one system to another. Infant restraint systems are certified to CMVSS 213.1.

A **child restraint system** is a forward-facing restraint system that is generally restricted to an occupant weight of 20 to 40 lbs. However, some systems can accommodate occupants of greater weight. Weight restrictions are specified on the system and can vary from one system to another. Child restraint systems are certified to CMVSS 213.

A **convertible restraint system** is a restraint system that can be used as an aft-facing system for infants and as a forward-facing system for children. These restraint systems are certified to both CMVSS 213 and 213.1.

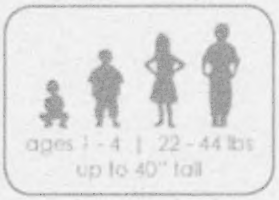
Certain manufacturers are also marketing a **combination system**, which is a combination of a child restraint system and booster cushion. When used as a child restraint system, the booster cushion will include an internal harness system. The internal harness system must be installed and all labelling requirements for child restraint systems must be met to be acceptable for use in an aircraft. When used as a booster cushion, the internal harness system is removed, and the device is therefore not approved for use in an aircraft. Combination systems are certified to CMVSS 213 and 213.2.

The CARES device

Child restraint systems are typically sold in the form of a car seat. However, Transport Canada recently accepted an alternative child restraint device called the Child Aviation Restraint System (CARES). Developed by AmSafe, CARES is a harness-type device that utilizes an aircraft passenger seat belt to secure a child's upper torso against the aircraft seatback.

CARES has been certified by the U.S. Federal Aviation Administration (FAA) and is intended for children ages

one to four, weighing between 22 and 44 lbs and measuring 40 in. or less in height. The CARES device was examined by Transport Canada, and the test criteria was found to be acceptable for use on Canadian aircraft. This new restraint device weighs one pound, can be easily transported, and offers an alternative method of child restraint to passengers travelling with small children.



(Images printed with permission from www.kidsflysafe.com/.)

Currently, Transport Canada permits the use of the CARES device for infants on Canadian aircraft through a global exemption and recommends that the CARES device be used within the limitations specified by the manufacturer on the device.

For more information on the CARES device, visit www.kidsflysafe.com/.

Child restraints and carry-on baggage requirements

It is important to note that Transport Canada does not consider a child restraint system, such as a car seat or the CARES device, to be carry-on baggage when it is carried on the aircraft as a means of restraining an occupant. However, if the device is not being used on board the aircraft, it is then considered carry-on baggage and must be stowed accordingly.

Additional information on child restraint systems can be found by visiting Transport Canada's Aviation Advisory Circular Web site at www.tc.gc.ca/CivilAviation/commerce/circulars/AC0177.htm.

A look ahead...

As Transport Canada continues to respond to questions and concerns about the use of child restraints on aircraft, the message remains the same: a child restraint system provides the greatest degree of protection for an infant or child during all phases of flight.

The Society of Automotive Engineers International (SAE) Aerospace Division has been working hard in the area of aviation child restraint design, taking into account the challenges posed by the particular design and construction of aircraft seats. Likewise, manufacturers have developed various prototypes of aviation child restraints. At the present time, the accepted standard continues to be the CMVSS 213 and 213.1, although ongoing research indicates that this standard may not continue to be appropriate for aviation use in the future.

TCCA is encouraged by emerging technology in aviation child restraints and is hopeful that new aviation child restraint systems will soon be approved for use on all flights in Canada and abroad. △

Flying the Wrong SID: Why Does It Happen?

by Gerard W.H. van Es, Senior Consultant, NLR-Air Transport Safety Institute, Amsterdam, the Netherlands

On April 29, 2001, an MD-83 was on a flight from Vancouver, B.C., to Seattle, Wash., taking off from Runway 08R of Vancouver International Airport. When the clearance delivery controller issued the clearance, he incorrectly gave a RICHMOND 6 standard instrument departure (SID). However, he wrote down the correct SID, VANCOUVER 2, *on both the digital and paper strip. The tower controller, seeing* VANCOUVER 2 *on his strip, assumed that the MD-83 would follow that SID. After takeoff, the MD-83 turned right to a heading of 140° as called for by the RICHMOND 6 SID. The MD-83 now conflicted with a DASH-8 that had taken off ahead, also on a RICHMOND 6 SID. The tower controller noticed the conflict and instructed the MD-83 to turn left. The separation had reduced to 2 NM, whereas 3 NM is required.* Source: NLR-ATSI Air Safety Database.

A standard instrument departure (SID) is an instrument flight rule (IFR) departure procedure that provides a transition from the runway end to the en-route airway structure. There are many operational advantages in using SIDs, both for the pilot and the air traffic controller. For the pilot, a relatively complicated route segment may be loaded from a database and flown using the flight management system (FMS), thus assuring him of proper clearance from obstacles, ground, or other traffic. Air traffic control (ATC) may clear the aircraft for the SID, thereby reducing the need for further instructions during the initial climb phase of the aircraft. This in turn greatly reduces the controller/pilot workload and frequency congestion.

SIDs are primarily designed to comply with obstacle clearance requirements, but are often optimized to satisfy ATC requirements; they may also serve as minimum noise routings. Small deviations from the assigned SID occur on almost every SID flown. Small deviations are quite normal and pose no immediate threat to flight safety. However, large deviations from the assigned

SID or flying the wrong SID can be hazardous. Such deviations may lead to (and have led to):

- Close proximity to terrain or obstacles;
- Close proximity to other aircraft; and
- Airspace violations.

There are many reasons for which an aircraft significantly deviates from an assigned SID. A recent study conducted by the NLR-Air Transport Safety Institute revealed 38 different causal factors associated with significant SID deviations. According to the study, the most important causal factor involved pilots using the wrong SID. (This factor accounted for 20 percent of the analyzed occurrences). Flying the wrong SID can be a very hazardous situation, especially when there are multiple take-off operations in place (e.g. parallel departures).

Let us consider SID blunders more closely. Why would a pilot use the wrong SID? Again, there is no single causal factor. However, some factors are more significant than others because they occur far more frequently. The NLR-Air Transport Safety Institute safety study showed that similar-sounding SID names were often a factor in cases where the pilots used the wrong SID. This should come as no surprise when there are other SIDs available with similar-sounding names. Often, the difference is only a single letter or number. For instance, *ELBA 5B* sounds and looks very much the same as *ELBA 5C*. The similarity can easily lead to mistakes when selecting either SID. When using the FMS NAV mode for flying the SID, the pilot selects the SID from the FMS database. Depending on the type of FMS, a list of runways is presented first. The pilot selects the runway, and a list of corresponding SIDs is given. Sometimes a list of SIDs—where the SIDs are automatically linked to a corresponding runway—is provided first. It is often impossible for the pilots to recognize that they are flying a wrong SID: in the cockpit, all instruments indicate that the aircraft is exactly on the pre-defined route! Usually, ATC notices such errors much earlier than pilots. The following example clearly illustrates the problem:

Before departure, the crew received ATC clearance from Runway 12, PEPOT 1F SID. *It was read back to ATC as* IPLOT 1F *without any correction from the controller. After departure, ATC monitored the departure well and took corrective action without delay when the controller noticed that the aircraft was flying the wrong SID. The SID should have been* PEPOT 1F. *Because of their prompt action, ATC prevented conflict with other traffic.* IPLOT *and* PEPOT *sound very similar when heard by radio.*

This example also illustrates another important factor identified in many occurrences where the wrong SID is flown: the readback/hearback error situation in which the pilot reads back the incorrect SID, and the controller fails to notice. This is a classic air-to-ground communication error. In the example above, the pilots were cleared for the *PEPOT 1F SID*, but read back the *IPLOT 1F SID*, which went unnoticed by the controller.

Another typical error related to flying the wrong SID is crew expectation, as shown in the next example:

The planned SID for the flight was a DAKE departure as had been used for years for this runway. After departure, ATC informed the crew that they were supposed to fly ELBA SID as this had been the cleared departure. The crew stated that their minds had been set for a DAKE departure, and that they did not change the SID in the FMS.

Clearly, the crew expected to fly a particular SID as they always had for this runway. When the controller instructs a completely different SID, the crew fails to notice and often reads back the correct SID. Only after they have taken off will the controller notice that the crew are flying the wrong SID.

Finally, another important factor is illustrated by the following example:

An ELBO 1A SID for Runway 25R was inserted into the flight management computer (FMC) according to the operational flight plan. This was also passed by the clearance delivery. However, when the aircraft was taxiing to Runway 25R, the departure runway was changed into 25L with a BEKO 1F SID. The pilot not flying forgot to change the ELBO 1A SID that was originally programmed into the FMC. The aircraft flew the SID of Runway 25R after takeoff.

Last-minute changes to the SID or departure runway are yet another important factor related to flying the wrong SID. In the example above, the pilot should not only change the runway/SID in the FMS, but should also conduct new take-off performance calculations for the new runway. Often, the SID is completely forgotten in this process, and the FMS uses the originally programmed SID.

As shown in this brief article, there are several reasons pilots use the wrong SID. In many cases, pilots play a crucial role. However, controllers can also be part of the chain of events that lead to flying the wrong SID.

(NOTE: In some examples, the names of the SIDs and runways have been changed due to the confidentiality of the original data. However, all examples are based on real cases.)

The complete study on SID deviations, An Investigation Into Standard Instrument Departure (SID) Deviations, *(NLR TP-2008-068), can be downloaded from the following Web site:* www.nlr.nl/smartsite.dws?id=8744. △

The Importance of the Underwater-Egress Pre-Flight Briefing for Passengers

by Jackie Heiler, Pro Aviation Safety Training

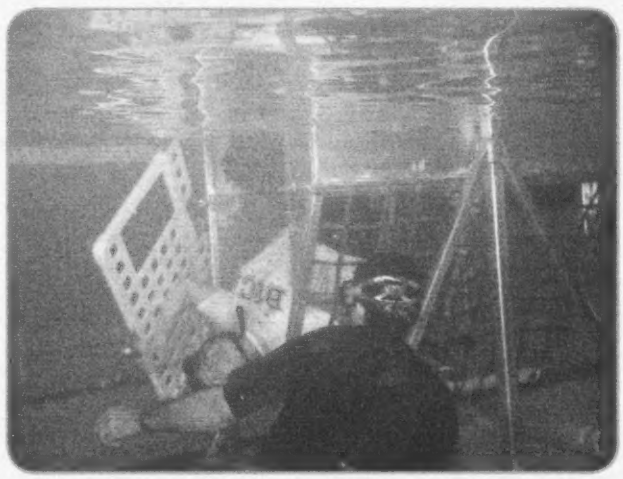
In recent years, Transport Canada and the specialized underwater-egress training industry have made considerable efforts in educating pilots and operators on the importance of underwater-egress procedures and training. Through pamphlets, newsletter articles, posters, videos and brochures, the aviation industry has received the bulk of the information and awareness materials. However, those education efforts have succeeded only partially; while our crews and operators are aware and ready, a very important segment of our industry—the passengers—has not benefited to the same extent from this awareness drive.

The reality is that the majority of passengers will not seek specialized underwater-egress training, and therein lies the challenge. How best to reach them? The aforementioned awareness materials are indeed available on-line for most of us who know how to find them. But then again, how many passengers will seek that specialized information? It is therefore the commercial operators—and their flight crews—who are in the best position to transfer this knowledge to the paying passengers. Other than the formal underwater-egress training program, the most effective and traditional way of accomplishing this knowledge transfer is to provide the best, most comprehensive pre-flight briefing possible—supported by a pre-flight video and reading material, such as a brochure or pamphlet.

For passengers, the most difficult part of surviving a ditching accident is the underwater egress. Accident reports indicate that many people survive the initial impact, but needlessly drown because they were unable to extricate themselves from the aircraft. A study on survivability in seaplane accidents conducted by the Transportation Safety Board of Canada (TSB) suggested that fatalities in seaplane accidents terminating in water are frequently the result of post-impact drowning. Most drownings occurred inside the cabin of the aircraft, and occupants who survived often found exiting the aircraft quite difficult. In fact, over two-thirds of the deaths occurred to occupants who were not incapacitated during the impact, but drowned trying to escape the aircraft.

Why do passengers encounter difficulties when trying to get out of an aircraft that has submerged? Panic, disorientation, unfamiliarity with escape hatches, and lack of proper training are some of the major factors that contribute to passenger drowning. During an emergency situation, rather than pause to think, most will react on instinct and as a result of learned behaviours; if people never acquired a learned behaviour that is appropriate for this type of situation—such as the steps to follow in an underwater-egress scenario—then the odds of reacting appropriately are much smaller. For example, when getting out of a car, most of us release our seat belt before opening the door. We do this without even thinking: it is a learned behaviour. If we are strapped into an aircraft that is sinking, a common reaction is to release our seat belt first, then try to get out. We have reverted to the learned behaviour we have acquired every time we get out of a car.

In many accidents, people have hastily and prematurely removed their seat belts and, as a result, have been moved around the inside of the aircraft due to the in-rushing water. With the lack of gravitational reference, disorientation can rapidly overwhelm a person. The end result is panic and the inability to carry out a simple procedure to find a way out of the aircraft.



Typical underwater-egress training exercise, professionally supervised and done with portable equipment in local pools.

Before releasing our seat belt, we need to stay strapped in our seat until the in-rush of water has stopped, our exit is identified, and we have grabbed a reference point. As long as we are strapped in our seated position, we have a reference point relative to our exit, which will combat disorientation. Also, pushing or pulling open our exit will be much easier if we are still strapped in our seat.

All on board must be familiar with the exits and door handles, and know how to use them with their eyes closed. This advice may seem simple, but think about the car example. Opening the door from the inside is not considered a difficult task. However, think back to a time when you were in a friend's car, and you couldn't locate or operate the door handle immediately.

An unfamiliar task, to be executed submerged, quite possibly upside down, in the dark, and in very cold

water: what could seem like a simple undertaking suddenly becomes monumental. To help prevent panic and disorientation, we recommend that you brief passengers thoroughly before each flight on the seven steps of underwater egress described below and taken from the brochure entitled *Seaplanes: A Passenger's Guide* (TP 12365) (www.tc.gc.ca/CivilAviation/SystemSafety/brochures/tp12365.htm).

Underwater Egress

In water accidents, seaplanes tend to come to rest inverted. The key to your survival is to retain your situational awareness and to expeditiously exit the aircraft. The following actions are recommended once the seaplane momentum subsides:

1. **Stay calm**—Think about what you are going to do next. Wait for the significant accident motion to stop.

2. **Grab your life preserver/PFD**—If time permits, put on, or at least, grab your life preserver or PFD. DO NOT INFLATE IT until after exiting. It is impossible to swim underwater with an inflated life preserver. You may get trapped.

3. **Open the exit and grab hold**—If sitting next to an exit, find and grab the exit handle in relation to your left or right knee as previously established. Open the exit. The exit may not open until the cabin is sufficiently flooded and the inside water pressure has equalized. DO NOT release your seat belt and shoulder harness until you are ready to exit. It is easy to become disoriented if you release your seat belt too early. The body's natural buoyancy will cause you to float upwards, making it more difficult to get to the exit.

4. **Release your seat belt/harness**—Once the exit is open, and you know your exit path, keep a hold of a fixed part of the seaplane and release your belt with the other hand.

5. **Exit**—Proceed in the direction of your nearest exit. If this exit is blocked or jammed, immediately go to the nearest alternate exit. Always exit by placing one hand on a fixed part of the aircraft, and not letting go before grabbing another fixed part (hand over hand). Pull yourself through the exit. Do not let go until you are out. Resist the urge to kick, as you may become entangled in loose wires or debris, or you might kick a person exiting right behind you. If you become stuck, back up to disengage, twist your body 90 degrees, and then exit.

6. **Get to the surface**—Once you have exited the seaplane, follow the bubbles to the surface. If you cannot do so, as a last resort inflate your life preserver. Exhale slowly as you rise.

7. **Inflate your life preserver**—Only inflate it when you are clear of the wreckage, since life preservers can easily get caught on wreckage, block an exit, or prevent another passenger from exiting.

Remember that a thorough pre-flight briefing can make the difference between life and death for your passengers. Better yet, encourage your regular passengers to enroll in a specialized underwater-egress training program. By practicing the skills for ditching and underwater egress in a pool with professional staff, passengers, too, can acquire the learned behaviour we discussed above and avoid becoming victims of this unforgiving situation.

The author and her husband run an established underwater-egress training program for flight crews and passengers in Victoria, B.C. For additional information, visit www.proaviation.ca. △

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Your Engine is Approaching TBO—Now What?

by Joe Escobar, Editor, Aircraft Maintenance Technology (AMT) *on-line magazine (www.amtonline.com). This article originally appeared in the March 2006 issue of* AMT Magazine, *and is reprinted with permission.*

As an engine gets older, builds operating hours, and approaches TBO [time between overhauls] (either based on operating hours or calendar limits) owners start to ask questions concerning the decision to either continue flying, have a top overhaul or major overhaul performed, or exchange engines. The following nine points are offered by Lycoming to help owners and mechanics evaluate each engine and make such a decision.

1. Oil consumption—any unusual increase?
2. Engine history and calendar age.
3. Pilot's opinion of the engine.
4. How has the engine been operated?
5. Maintenance—what kind has the engine received?
6. What does the oil filter tell?
7. What has been the trend in compression checks?
8. What do the spark plugs show?
9. Refer to the engine manufacturer's service letter for engine life and recommended overhaul periods.

Lycoming discusses each point more specifically in the following.

1. Oil consumption

Both the operator and mechanic should know what the general history of oil consumption during the life of the engine has been.

A possible danger signal concerning engine health is a definite increase in oil consumption during the recent 25 to 50 hr of flight time. The oil screens and filter should be carefully observed for signs of metal.

Maintenance should also take a good differential compression check at this time. The mechanic should look in the cylinders with a gooseneck light or a borescope to detect any unusual conditions in the combustion chamber.
If you haven't looked at the air filter lately, it would be a good idea to carefully inspect it for wear and proper fit. This is all the more important when operating in dusty areas, and definitely could be a cause of increased oil consumption.

2. Engine history and calendar age

If an engine has been basically healthy throughout its life, this would be a favourable factor in continuing to operate it as the engine approached high time.

Alternately, if it has required frequent repairs, the engine may not achieve its expected normal life. A logbook inspection would reveal any accumulative record of engine repairs.

Another important aspect of an engine's history would be its calendar age. Engine flight time and calendar age are equally important to the operator. Engines flown infrequently do tend to age or deteriorate more quickly than those flown on a regular basis. Therefore, Lycoming recommends both an operating hour limit and a calendar year limit between overhauls. Service Instruction 1009 gives these recommendations, but other items in this checklist will help to determine if an overhaul or engine exchange is needed before the engine reaches these recommended limits.

3. Pilot's opinion of the engine

The pilot's opinion of the powerplant based on his or her experience operating it is another important point in our checklist. The pilot will have an opinion based on whether it has been a dependable powerplant, and whether or not he or she has confidence in it. If the pilot lacks confidence in an engine as it approaches the manufacturer's recommended limits, this could be a weighty factor in the decision to continue flying or to overhaul it. The pilot should consult with maintenance personnel concerning their evaluation of the condition of the powerplant.

4. Operation

The basic question here would be how the engine has been operated the majority of its life. Some engines operating continuously at high power, or in dusty conditions, could have a reduced life. Likewise, if the pilot hasn't followed the manufacturer's recommendations on operation it may cause engine problems and reduce the expected life. This becomes a more critical influence on a decision in single-engine

aircraft, and also for single- or twin-engine planes flown frequently at night or in IFR conditions.

5. Maintenance

Good maintenance should aid in achieving maximum engine life; alternately, poor maintenance tends to reduce the expected life. Lycoming says it has noticed that among the powerplants going back to the factory for rebuild or overhaul, the smaller engines in general have had less care and attention, and in a number of instances have been run until something goes wrong. The higher-powered engines have generally had better maintenance and show evidence that the operators do not wait until something goes wrong, but tend to observe the manufacturer's recommended operating hour or calendar limits to overhaul. The engine logbook should reflect the kind of maintenance provided the engine or engines. The mechanic who regularly cares for the engine will usually have an opinion about its health.

6. What does the oil filter tell?

Clean oil has consistently been an important factor in aiding and extending engine life. A good full flow oil filter has been a most desirable application here. When the filter is changed, open it and carefully examine for any foreign elements, just as is accomplished at oil change when the engine oil screen is examined for the same purpose. Just as the spark plugs tell a story about what is going on in the engine, so do the engine oil screen and the external oil filter tell a story about the health of an engine. Whether the engine is equipped with an oil filter or just a screen, oil changes should be accomplished in accordance with the manufacturer's recommendations. These oil changes should have been recorded in the engine logbook.

If oil is analyzed, it should be done at each oil change in order to establish a baseline. Analysis is a tool which only gives useful information when a dramatic departure from the established norm occurs.

7. Compression checks

What has been the trend in compression in at least the last two differential compression checks? The differential compression check is the more reliable type and should be taken on a warm engine. If the differential check reveals 25 percent loss or more, then trouble may be developing. A compression test should be made anytime faulty compression is suspected, anytime the pilot observes a loss of power in flight, when high oil consumption is experienced, or when soft spots are noticed while hand pulling the prop.

Many mechanics do a compression check at each oil change, and it is also considered part of the 100-hr engine inspection and the annual inspection. Most experienced mechanics feel that the differential compression check is best used to chart a trend over a period of flight hours. A gradual deterioration of charted compression taken during maintenance checks would be a sound basis for further investigation.

8. Spark plugs

The spark plugs, when removed and carefully observed, tell you what has been happening in the cylinders during flight, and can be a helpful factor in deciding what to do with a high time engine:

1. Copper run out and/or lead fouling means excessive heat.
2. Black carbon and lead bromide may indicate low temperatures, the type of fuel being used, and possibly excessive richness of fuel metering at idle.
3. Oil-fouled plugs may indicate that piston rings are failing to seat, or excessive wear is taking place.
4. The normal colour of a spark plug deposit is generally brownish grey.
5. In high compression and supercharged engines, a cracked spark plug porcelain will cause or has been caused by pre-ignition.

9. Engine manufacturer recommended overhaul life

Service Instruction 1009 is the Textron Lycoming published recommendation for operating hour and calendar year limits until engine overhaul as they apply to each specific engine model. The amount of total operating time on an engine will be a basic factor in any decision to either continue flying, change, top, or major overhaul the powerplant. Operators should be reminded, however, that the hours of service life shown in the service instruction are recommendations for engines as manufactured and delivered from the factory. These hours can normally be expected provided recommended operation, periodic inspections, frequent flights, and engine maintenance have been exercised in accordance with respective engine operator's manuals.

If an operator chooses to operate an engine beyond the recommended limits, there are factors to consider. The cost of overhaul is likely to be greater as engine parts continue to wear, and the potential for failure may also increase.

Operators who have top overhauled their engine at some point in the engine life invariably want to know if this extends the life of the engine. This is an important question. The chances are that if the operator applies the checklist we have been discussing and comes up with favourable answers to these questions about his engine, he can probably get the hours desired—with only a few

exceptions. But a top overhaul does not increase the official life or TBO of the engine.

Lycoming says it is surprised from time to time by owners who say they top overhauled their engine at some point less than the major overhaul life for no reason other than somebody said it was a good idea. Unless the manufacturer recommends it, or there is a problem requiring a top overhaul, this is a needless cost. If the engine is healthy and running satisfactorily, then leave it alone! One other point deserves attention here: there is no substitute or cheap route to safety in the proper maintenance or correct overhaul of an engine.

Apply all of these basic nine points concerning your engine or engines and then make a decision whether to top overhaul, major overhaul, exchange engines, or continue flying.

Additional resource: www.lycoming.textron.com. △

Back Shop: Industry Insights

by Bart J. Crotty. This article was previously published in Aviation Maintenance *magazine and is reprinted with permission.*

Personal, subjective approaches to affect safety emphasize addressing self-preservation, professional pride and concern for public and other workers' well-being. Another approach could be instilling a respect for aviation objects or equipment used by worker groups—namely, adopting a Zen Buddhist reverence for aircraft.

Round the Bend, a 1951 novel by Nevil Shute (1899-1960), pays homage to a mystical aircraft ground engineer (mechanic). The story is about a struggling English pilot/owner, Tom Cutter, and his small airline operating from Bahrain and the relationships with his first-rate, ascetic Eurasian chief mechanic, Connie. Connie has a special intuitive understanding of the aircraft he works on—all to the increased reliability and safety of the airline's operations. Others in the polyglot company eventually grow in self-development from Connie's caring, reverent, and positive example. The book title refers to the phrase, now out of vogue, of someone gone too far, losing their origins; in this case, it means "gone native", to be exact.

Years back, I acquired an interest in Nevil Shute, whose aviation background (airship and aircraft designer) led him to write a few fictional and non-fictional aviation works, *Slide Rule* and *No Highway* respectively. His other books, include *A Town Called Alice* and *Requiem for a Wren.*

My aviation career began as an aircraft mechanic and I've never lost that foundation and pride, although I've acquired other experiences/qualifications in flight operations, training, regulations, security, engineering design, human factors (HF), accident investigation, and safety. I've never come across an aviation novel that focuses more on an aircraft mechanic's plight or gives personal insights to maintenance than *Round the Bend.*

In my being ever-open to unusual or unorthodox ways to gain workers' attention and appeal to one's sensibilities to further aviation safety, the notion recently struck about "respect or reverence" as a construct applied to aircraft themselves. If pilots, mechanics, air traffic controllers, etc., developed more genuine respect for their flying machines, animating or personifying them so to speak, giving them some degree of human/spiritual consideration, then that respect would result in more care given in the operation, maintenance, control and handling of aircraft.

Even before the infamous Aloha Airlines B-737 upper fuselage peel-back accident of 1988, I began, and continue today, to study and champion efforts to apply HF maintenance/inspection training and awareness to prevent or reduce maintenance personnel or management error. On recent charter operator safety/security auditing trips to India and Africa, I found myself giving unplanned, spontaneous "Dutch uncle" type talks to small groups of pilots/mechanics, trying to motivate them to think and act in terms of safety. But it never dawned on me to emphasize the internalizing or feeling aspect of safety—that is, exploiting an emotional or spiritual basis for safety. Granted, it won't apply or take root with everyone's character/values, but surely there are many who would be affected and would accept and adopt this approach to some degree.

I do much of my consulting brainstorming or contemplative thinking on return flights of business trips and the novel *Round the Bend* surfaced in my memory at 36 000 ft. Sure enough, later at home, I found I still had my old yellowed paperback copy.

I've now decided to include this Zen Buddhism approach—inculcating a respectful/spiritual base to aviation safety—in my future HF and safety training sessions for maintenance and ramp service personnel. A typical application could be to hold two one-hour training sessions wherein the basic principles of Zen Buddhism are introduced, and then show and explain the potential resulting benefits. Namely, increased work area safety awareness; more concern for fellow workers' well-being; reduction of personal and workplace stress; and new or increased respect/reverence for aircraft, tools and equipment, etc. This is no attempt to

proselytize or recruit new believers; it is just a new way to raise the awareness to increase overall aviation safety.

Admittedly, not many owners/management will pioneer and embrace this different approach to improve their safety programs. And like many training efforts, it would be difficult to justify or show post-training benefits or improvements in concrete terms.

Just the phrase "Zen Buddhism" could be enough to send many in management running in the opposite direction.

I'll leave answering the sarcastic last sentence to *Round the Bend*'s main character, Tom Cutter: "People are saying I've been out East too long and I've gone round the bend. Maybe I have, but then I think that being round the bend is the best place to be..."

One of Zen Buddhism's tenets is to piously ponder a question (koan) that has no right or wrong, or rather no definitive answer. Now, besides considering the Zen way to improve aviation worker safety, one has two other things to ponder about: possibly being round the bend themselves, and then contemplating that idea.

End notes:

1. *Zen and the Art of Motorcycle Maintenance*, 1974, by Robert M. Pirsig surely gave me a nudge in the direction of aircraft maintenance; however, the book has no strong foundation in Zen or other schools of Buddhism. It's a non-fictional account of a modern man trying to find his inner sense of caring and feeling in a doubtful world.

2. My article, *Zen and the Art of Aircraft Maintenance*, appeared in the monthly aviation publication *Aviation Maintenance*, Sept. 2007 issue.

About the author:
Bart J. Crotty is an airworthiness/maintenance/flight operations/safety/security consultant, expert witness, writer, and the maintenance HF chairman for the International Society of Air Safety Investigators. He resides in Springfield, Virginia. Readers can reach him at bjcrotty@verizon.net. △

Fatigue Risk Management System for the Canadian Aviation Industry: Fatigue Management Strategies for Employees (TP 14573E)

This is the second in a seven-part series highlighting the work of the Fatigue Risk Management System (FRMS) Working Group and the various components of the FRMS toolbox. This article deals with TP 14573E, a workbook designed for Transport Canada Civil Aviation employees. We encourage our readers to consult the complete toolbox documentation by visiting www.tc.gc.ca/civilaviation/SMS/FRMS/menu.htm. *—Ed.*

Why a training program on fatigue risk management?

Transport Canada is committed to improving aviation safety through the management of fatigue-related risks. To this end, a set of tools was developed to support the Canadian aviation industry in implementing a fatigue risk management system (FRMS) within safety management systems (SMS). An important part of an FRMS consists in training all employees in the management of fatigue as a safety hazard. To achieve this goal, the tools developed include various training materials that are designed to meet the business needs of participating organizations and the skills-development needs of their employees in relation to fatigue risk management.

Managing human resources has always been a demanding task, and now, more than ever, industry must acknowledge the unique needs of employees who work outside the Monday-to-Friday, 9-to-5 schedule. Non-traditional work-schedule designs have benefits for employers and employees. However, decisions made without thorough knowledge of the safety, family, or social impacts of such hours could result in shift patterns that compromise any potential benefits. Appropriate and efficient management of the workforce is crucial to meeting the demands of the *Canadian Aviation Regulations* (CARs) and ensuring high levels of work-site productivity.

What is the purpose of this workbook (TP 14573E)?

This workbook aims to provide the knowledge and skills to help you adopt appropriate fatigue-management strategies. More specifically, you will learn how to

- monitor potential causes of fatigue and devise action plans to minimize their effects in accordance with company procedures;
- identify personal warning signs of fatigue and appropriate countermeasures in accordance with workplace procedures to ensure that effective work capability and alertness are maintained;
- make positive lifestyle choices to promote the effective long-term management of fatigue;
- adopt and apply effective practices and countermeasures for combating fatigue; and
- communicate your personal fatigue-management strategies to relevant people.

How to use this workbook?

This workbook involves a combination of theory and practical strategies related to both work and non-work situations. This study guide will be your reference during your training.

Each chapter begins with a list of learning outcomes. These are provided to organize the training around clearly defined outcomes that students are expected to demonstrate on completion. The content of each chapter includes background information on the featured topic and related practical strategies to minimize the effects of non-traditional work hours and fatigue. Topics covered include sleep, nutritional, physical, social, and work-design strategies to minimize the risk of fatigue.

Exercises are provided throughout the workbook. Students are asked to demonstrate that they can apply the knowledge learned to everyday situations by completing the exercises provided in each chapter. Knowledge checks are also included at the end of each chapter to allow students to verify whether they need to review some of the content or not.

Will this program be assessed?

Depending on the training format chosen by your company, you may have to complete an assessment to receive a certificate of completion for this course. Your trainer or supervisor will inform you if an assessment process will be used and of its exact format. An assessment can take various forms, including the ones described below.

If your training program includes classroom delivery for this course, the assessment could include group and case-study exercises (written and oral) to reinforce the course content.

By completing the exercises in each chapter of the workbook, you may demonstrate that you are able to apply this learning to your individual work situation. This type of assessment may be endorsed by the assessor or your supervisor.

You may be asked to complete an assessment exercise to show that you have retained knowledge and acquired skills from this training. This type of assessment involves answering questions on the content of this workbook (similar to the exercises and knowledge checks).

Skill achievement may also be demonstrated by maintaining a candidate's log. This process requires you to record how you have applied the skills learned during the course in your specific work situation and daily life.

Working non-traditional hours —living in a 24-hour society

We live in a 24-hour society where many different work patterns have developed beyond the traditional Monday-to-Friday, 9-to-5 routine. An increasing proportion of the workforce is engaged in shift work and non-traditional schedules. Between 15 and 30 percent of the workforce of industrialized countries is engaged in shift work. In Finland, 25 percent of the working population are shift workers, while in Singapore that figure is closer to 32 percent. In Canada, approximately 30 percent of workers are employed in some form of shift work.

Working shifts or non-traditional hours involves more than just a work schedule. It is a way of life with a fundamental impact on not only work, but also sleep patterns and the management of health, family, and social lives. Research also indicates that shift work affects physical and mental health, as well as work performance.

Exercise 1. *What are some of the personal difficulties that you or some of your co-workers have experienced as a result of shift work or non-traditional working hours?* _____

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What is fatigue?

Fatigue is an experience of physical or mental weariness that results in reduced alertness. For most people, the major cause of fatigue is not having obtained adequate rest or recovery from previous activities. In simple terms, fatigue largely results from inadequate quantity or quality of sleep. This is because both the quantity (how much) and the quality (how good) of sleep are important for recovery from fatigue and maintaining normal alertness and performance. Furthermore, the effects of fatigue can be made worse by exposure to harsh environments and prolonged mental or physical work.

Inadequate sleep (whether because of lack of quality or quantity) over a series of nights causes a sleep debt, which results in increased fatigue that can sometimes be worse than a single night of inadequate sleep. A sleep debt can only be repaid with adequate recovery sleep.

Working outside the Monday-to-Friday, 9-to-5 routine can limit the opportunity for sleep and recovery in each 24-hour period. Working outside this schedule can reduce the amount of sleep you get by between one and three hours per day. This is because these hours of work

- limit the amount of time available for sleep; and
- disrupt the body clock, which is programmed for activity during the day and sleep at night.

In addition to sleeping less, people who work non-traditional hours often obtain sleep of a lower quality.

In the current 24-hour, 7-day-a-week society, there are many reasons that workers do not obtain the quality or quantity of sleep that they require to be adequately rested. Some of these reasons are work-related and some are non-work related. Examples of work-related fatigue factors are

- hours of work (especially night work, early-morning starts, and high total number of hours);
- task demands or time pressures that do not allow for adequate breaks during shifts; and
- working conditions that may compound fatigue (for example, heat stress and time pressures).

Examples of non-work-related fatigue factors include

- undiagnosed or untreated sleep disorders; and
- individual family or social factors that take priority over sleep.

Exercise 2. *Identify at least two causes of work-related fatigue that have affected you during your working life.*

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For more discussions, exercises, and case studies on topics such as symptoms of fatigue, sleep, or napping, visit www.tc.gc.ca/CivilAviation/SMS/pdf/14573e.pdf. △

ACCIDENT SYNOPSES

Note: All reported aviation occurrences are assessed by the Transportation Safety Board of Canada (TSB). Each occurrence is assigned a class, from 1 to 5, which indicates the depth of investigation. A Class 5 consists of data collection pertaining to occurrences that do not meet the criteria of classes 1 through 4, and will be recorded for possible safety analysis, statistical reporting, or archival purposes. The narratives below, which occurred between August 1, 2008, and October 31, 2008, are all "Class 5," and are unlikely to be followed by a TSB Final Report.

— On August 1, 2008, a Rans Coyote S6S aircraft was on climb-out after taking off from the grass Runway 34 at the Greenbank, Ont., airstrip (CNP8) with the pilot and one passenger aboard. At approximately 150 ft above ground level (AGL), the engine (Rotax 912) sputtered, but regained power. The aircraft was then observed in a tight left-hand turn. The turn continued until the aircraft stalled and entered a spin to the left. The aircraft struck the ground in a flat attitude and a fire erupted immediately after ground impact. Both occupants were fatally injured and the aircraft was destroyed. Examination of the aircraft and its flight controls revealed no anomalies. The engine was substantially damaged during the post-crash fire, and no fuel components were recovered for testing. The weather at the time of the occurrence was visual meteorological conditions (VMC). The Greenbank airstrip is surrounded by flat, cultivated farm fields that are suitable for forced landing no mater which direction the aircraft is heading. *TSB File A08O0208.*

— On August 3, 2008, a privately operated Lake LA-4 amphibian airplane was landing on Harris Lake, Ont., after a local flight. After landing on the water, the airplane struck a boat wake resulting in a swing (water loop) to the right and the right sponson catching the water. The airplane sustained damage to the right wing (sponson bent) and aft fuselage (buckled forward of the empennage). There were no injuries and the airplane was moved to shore. *TSB File A08O0212.*

— On August 5, 2008, a privately owned Taylorcraft BC-12D with one person on board was conducting a local visual flight rules (VFR) flight from St-Michel-de-Squatec, Que. Upon takeoff, the aircraft struck hydro wires and ended up inverted next to a road. No one was injured. However, a fire broke out after the impact, and the aircraft was destroyed. *TSB File A08Q0146.*

— On August 6, 2008, an amateur-built Christen Eagle II biplane was landing at the Markle farm airstrip near Claresholm, Alta. The airstrip was mowed to a width of approximately 50 ft and the right edge was bordered by a standing hay crop. The aircraft touched down to the right of centre and during the landing roll, the bottom right wing entered the hay crop. Directional control could not be maintained and the aircraft swerved right, rolled over and came to rest inverted. The aircraft sustained substantial damage; however, the two occupants were uninjured. The Christen Eagle II is a tail-dragger aircraft and the pilot was seated in the rear cockpit; therefore the pilot's forward view was blocked by the fuselage when the aircraft entered the three-point landing attitude. *TSB File A08W0156.*

— On August 6, 2008, a Beech 1900C was on a cargo flight from Moncton, N.B., to Montréal/Mirabel, Que. When the crew selected gear down on approach to land at Mirabel, the nose gear indicated IN TRANSIT. After discussion with company dispatch, the crew elected to

land on Runway 06R at the Montréal/Pierre Elliott Trudeau International Airport. An emergency was declared and emergency response services (ERS) were in position for landing. The nose gear collapsed on the landing roll. The two crew members exited the aircraft while it was on the runway; they were not injured. Runway 06R was temporarily closed until the aircraft was removed. *TSB File A08Q0150.*

— On August 9, 2008, the pilot of a Speedwing motorised Delta hang-glider with an 18 m square wing from Air Création, was practicing taxi manoeuvres on Runway 03 at Matagami, Que., when the aircraft suddenly lifted off. The pilot had not yet been trained to fly this type of aircraft and had not intended to take off. He was unable to control the aircraft before it stalled from a height of approximately 60 ft above ground level (AGL). The aircraft landed on its right side, 100 ft from the side of the runway in a ditch. The pilot was seriously injured. The aircraft was destroyed. *TSB File A08Q0151.*

— On August 11, 2008, a PZL M-18A Dromader aircraft landed at the Moose Jaw, Sask., airport and taxied to the fuel pumps. While taxiing the aircraft into position in front of the fuel pumps, the left wing struck a parked Cessna 182L aircraft. There were no injuries. The Dromader sustained minor damage to the left wing tip and the parked Cessna 182 sustained substantial damage. *TSB File A08C0174.*

— On August 12, 2008, several hot air balloons took off from St-Jean, Que., during a hot air balloon festival. About 45 min after takeoff, the balloons were forced to land as stormy weather headed in. A Sundance Balloon SBA90 with a pilot and three passengers on board was among one of the balloons that landed. However, after the landing, the pilot ended up outside the basket, leaving the passengers alone on board. The balloon started climbing again, and two of the passengers jumped out of the basket. The balloon continued to climb with the one remaining passenger on board, flew over a power line, and started descending again. The balloon's flight was finally stopped in a wooded area and with the help of some people on the ground. The three passengers sustained minor injuries; the pilot was seriously injured. The basket was not damaged, but the envelope had tears. *TSB File A08Q0153.*

— On August 14, 2008, a Robinson R22 Beta helicopter was conducting a training flight with an instructor and a student-pilot on board. During the flare at the end of an autoration, the helicopter blades hit and cut a metal wire. The aircraft landed without further incident. The blades sustained serious damage. No one was injured. *TSB File A08Q0155.*

— On August 14, 2008, a Bell 206L helicopter was landing near mile 247 on Saskatchewan Hwy 905, when the skid gear became entangled in rocky terrain. The aircraft entered a dynamic rollover condition and sustained substantial damage. The pilot, the sole occupant, was transported to hospital in La Ronge, Sask., treated for minor injuries, and later released. *TSB File A08C0175.*

— On August 19, 2008, a Cessna 150M took off from the St-Hubert, Que. airport on a training flight with a student-pilot on board. The pilot declared an emergency due to engine trouble and attempted an emergency landing in a field. The aircraft nosed over during the ground run and came to a stop on its back. The pilot was uninjured. An investigation of the aircraft, the engine and its systems revealed no anomalies that could have caused the engine to fail. The temperature and dew point during the flight were in a dangerous icing range and could have caused the engine to fail if the carburetor de-icing procedure was not applied properly. The student-pilot was not very familiar with the carburetor de-icing procedures on Cessna 150-type aircraft. *TSB File A08Q0172.*

— On August 27, 2008, while lifting off from a clearing 45 NM southwest of Yellowknife, N.W.T., the left skid gear of the Bell 206B helicopter caught on a stump. The helicopter rolled slightly to the left, and tipped backwards. The main rotor blades contacted the ground and severed the tail boom. The helicopter remained upright with the tail down-slope, sustaining substantial damage. There were no injuries to the pilot or two passengers. *TSB File A08W0187.*

— On September 1, 2008, a Tundra ultralight aircraft was returning to the airport at Vernon, B.C., after a flight to Salmon Arm, B.C. Observers report that when the aircraft was roughly overhead the airport, an unusual noise was heard, the aircraft's elevators were seen fluttering and the tail boom was seen flexing. Engine power was heard to be reduced, the aircraft banked and the elevator flutter stopped momentarily, but it started again more violently shortly thereafter. Engine power was heard to be further reduced, but at about 200 ft above ground level (AGL) the aircraft rolled inverted and dived into the ground. The pilot received fatal injuries and the aircraft was destroyed. There was no fire. The TSB attended the accident site and provided factual information to support the coroner's investigation. Wreckage examination determined that the pilot had made several significant modifications to the aircraft, including the installation of a large Lexan elevator trim tab. The trim tab was hinged on its leading edge for only 10 in. of its 18-in. span and was actuated from the pilot's position by a Bowden cable. The inner wire of the Bowden cable was 0.054 in. in diameter. The outer sheath of the Bowden cable was attached at

its aft end to an inch-long post hinged to the trailing edge of the left elevator. Damage to the trim tab and elevator indicate flutter of both control surfaces. The 5-in. diameter aluminium tube (tail boom) that attaches the empennage to the fuselage was fractured through about 80 percent of its diameter. Metallurgical examination determined that the fracture was the result of reverse bending fatigue which occurred after a relatively low number of bending cycles. *TSB File A08P0287.*

— On September 2, 2008, an amateur-built Super Bee was preparing to land on lac Lepage, Que., in glassy-water conditions. The pilot attempted to pull the aircraft out of its dive because he felt that his rate of descent was too high. The floats struck the surface of the lake hard, and the aircraft immediately nosed over and sank a few minutes later in approximately 40 ft of water. The pilot and the passenger were able to egress and were not injured. They were wearing flotation devices and swam to shore. The aircraft sustained major damage. *TSB File A08Q0177.*

— On September 3, 2008, as an amateur-built Cargo 4x4 took off, its left float touched a rock on the surface of the water on rivière des Mille Îles near Terrebonne, Que. The aircraft destabilized, went down nose first, ended its run inverted, and ran ashore on Lamothe Island. The pilot was wearing a flotation device and was not injured. *TSB File A08Q0174.*

— On September 3, 2008, a MD369D helicopter was transporting three passengers from one side of a glacier to the other, about 40 NM north of Stewart, B.C. The weather was overcast, with scattered cloud below (flat light condition). The helicopter struck the glacier in forward flight and nosed over to the right. The helicopter was substantially damaged but there was no fire. The four occupants sustained minor injuries. *TSB File A08P0288.*

— On September 13, 2008, a de Havilland DHC-2T (Turbo Beaver) on amphibious floats departed the runway at Dease Lake, B.C., with three persons on board for a local flight. The aircraft landed at Level Lake, B.C., where it nosed-over during the landing. All three occupants exited the aircraft and sustained minor injuries. The landing gear was subsequently observed to be in the extended position. *TSB File A08P0299.*

— On September 24, 2008, a privately owned float-equipped Cessna 180H with two occupants on board took off on a visual flight rules (VFR) flight from Réservoir Gouin, baie Marinette, Que., to the southern bay of Réservoir Gouin. During landing, the right float hit a wood log and split. The aircraft capsized. The two occupants were able to egress and were not injured. They were rescued by a boat immediately after the incident. *TSB File A08Q0190.*

— On October 7, 2008, a Piper Aztec PA23-250 was conducting a visual flight rules (VFR) flight between Drummondville, Que., and Mascouche, Que. While on the base leg, the pilot, the only one on board, was supposed to follow a Cessna 172 that was executing a touch-and-go. The pilot was focussing on the Cessna 172 and inadvertently forgot to lower the landing gear. The aircraft landed with the landing gear retracted and slid on its belly. The pilot was not injured. The aircraft sustained damage to the landing gear doors, two flaps, propellers and engines. *TSB File A08Q0197.*

— On October 10, 2008, a Cessna T210G was on final approach to Runway 26 at the Red Lake, Ont., airport. During final approach, the landing gear was not extended and the aircraft landed on its belly. The aircraft came to a rest in an upright position on the centre of the runway. The pilot was not injured, but the aircraft sustained substantial damage. *TSB File A08C0210.*

— On October 13, 2008, a Cessna 172 was taxiing for takeoff from Runway 06R at Montréal-Pierre Elliott Trudeau International Airport (CYUL). As it approached the Runway 06R holding bay, the Cessna 172 received authorization to go behind a Boeing 777 that was stopped on the left side of the holding bay with jet engines at idle. Once the Cessna was behind the Boeing 777, its left wing and tail were lifted up such that the propeller and right wing struck the ground before the aircraft returned to its normal position. The pilot informed the apron controller and returned to his parking spot to assess the damage. The right wing, engine cowl, and propeller sustained damage. The pilot was not injured. *TSB File A08Q0199.*

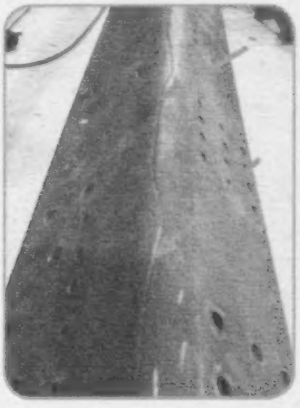
— On October 16, 2008, the pilot of a Bell 206B helicopter was attempting to sling a moose carcass out of the woods, when the sling became caught over the right skid. The aircraft reached an altitude of approximately 20 ft and dynamically rolled to the right and into the Kenogami River, Ont. The helicopter was substantially damaged; there were no injuries. *TSB File A08O0294.* △

The following summaries are extracted from Final Reports issued by the Transportation Safety Board of Canada (TSB). They have been de-identified and include the TSB's synopsis and selected findings. Some excerpts from the analysis section may be included, where needed, to better understand the findings. We encourage our readers to read the complete reports on the TSB Web site. For more information, contact the TSB or visit their Web site at www.tsb.gc.ca. *—Ed.*

TSB Final Report A05W0059—Component Failure—Wing-to-Fuselage Attach Angle

On April 12, 2005, a Lockheed L382G Hercules departed High Lake, Nun., for Yellowknife, N.W.T., with four crew members on board. At 11:39 Mountain Daylight Time (MDT), approximately 10 min after departure, as the aircraft was climbing through 18 000 ft, the crew heard a bang from the cargo area. When they examined the cargo compartment, they heard the sound of air escaping from the left side of the compartment and discovered a crack estimated to be 24 in. long and approximately one-half inch wide in the left wing-to-fuselage attach angle (drag angle).

When the flight crew learned there was a major structural failure, the aircraft was levelled off at FL230 and depressurized. Speed was reduced to 180 KIAS (knots indicated airspeed), an emergency was declared, and all crew members went on oxygen. The aircraft was level for about 5 min then descended to FL220 for the direction of flight, and remained level for about 35 min. The flight crew later descended to 10 000 ft to ensure they were well supplied with oxygen. By this time, the crack was no longer visible. On nearing Yellowknife, the aircraft was slowed to 140 KIAS (rather than 170 KIAS) when the landing gear was lowered. The aircraft landed safely at 13:12 MDT with the flap retracted. Aircraft rescue and firefighting (ARFF) crews and equipment were standing by. There were no injuries.



Arrows indicate crack in attach angle

Finding as to causes and contributing factors

1. Fatigue crack initiation and propagation occurred in the bend radius of the left attach angle at fuselage station (FS) 577, which resulted in failure of the component. The left wing-to-fuselage attach angle repair that was accomplished at FS 497 in 1987 extended the component installation time in service, with no suitable method to cover crack detection at FS 577.

Findings as to risk

1. Service Bulletin (SB) 382-53-61/82-752, including the basic release and Revisions 1 and 2, did not address replacement of previously repaired attach angles, increasing the risk that L-382 or C-130 aircraft (serial numbers 4383 to 5305) that were operating with repaired attach angles might have experienced an in-flight failure of the attach angles at FS 577.
2. The repair at FS 497, which was approved by the designated engineer representative (DER), restored the right attach angle to its original strength; however, the repair approval did not include a continuing maintenance program to cover crack detection at FS 577, increasing the risk of attach angle cracks occurring at FS 577 due to extended time in service.

Other finding

1. The electronic, low profile, platform scale system that was used to weigh the aircraft was unsuitable, as configured and calibrated, for weighing a Lockheed L382.

Safety action taken

On May 9, 2005, the Transportation Safety Board of Canada (TSB) sent an Aviation Advisory (A050011-1) to Transport Canada, suggesting that Transport Canada advise other commercial and military L382/C-130 operators of the circumstances of this incident. The advisory also suggested that regulators and the manufacturer consider a requirement for operators to replace repaired attach angles and establish a service or cycle life for attach angles on L382/C-130 aircraft manufactured prior to serial number 5306.

On September 29, 2005, Transport Canada responded to the Safety Advisory. The letter stated that the aircraft involved in the occurrence was the only civilian version registered and operating in Canada, and that the operator had complied with the recommended replacements of the attach angles. The letter also stated that the information the TSB provided had been forwarded to the responsible design authority, the U.S. Federal Aviation Administration (FAA), and the

Canadian Department of National Defence (DND), which operates military versions of this aircraft.

Following the occurrence, the operator replaced the left and right attach angles on the occurrence aircraft.

As a result of this occurrence, Lockheed Martin issued Revision 3 of SB 382-53-61/82-752, dated 04 August 2005. Revision 3 of the SB specifically identified the need for a visual inspection of the wing-to-fuselage attach angles on applicable aircraft to be accomplished within 30 days after the receipt of the SB to determine if repairs have been installed, and further recommended replacement of any previously repaired attach angle within 365 days.

The FAA Atlanta Aircraft Certification Office is evaluating this SB and the history of this problem to determine if further regulatory requirements should be issued.

TSB Final Report A05P0080—In-Flight Fire

On April 22, 2005, a Piper PA-31-350 was on a scheduled cargo flight from Nanaimo, B.C., to the civilian terminal on the south side of the military airbase at Comox, B.C. The crew members established communication with the Comox tower when they were at about 2 000 ft over Hornby Island (12 NM southeast of Comox), and requested a practice back course/localizer approach to Runway 30, circling for landing on Runway 18. The request was approved and the aircraft continued inbound.

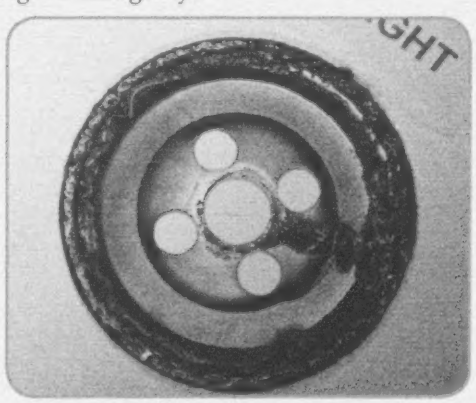
When the aircraft was about 2 mi. from the threshold of Runway 30, the crew declared an emergency due to an engine fire in the right engine. The tower alerted the airport response teams and requested standard data from the crew concerning the number of people and amount of fuel on board. Less than 30 s after the crew first reported the emergency, the aircraft was engulfed in flames. Shortly thereafter, at 07:41 Pacific Daylight Time (PDT), the aircraft rolled inverted and struck the ground in a steep, nose-down, left-wing-low attitude. The aircraft broke apart and burned. Both crew members were fatally injured.

Analysis

Based on the fire pattern in the accessory section of the right engine and on the inspection and testing of involved components, it was apparent that an oil filter converter plate gasket had failed, allowing pressurized engine oil to spray into the engine compartment. The engine oil ignited, likely on contact with hot turbo-charger/exhaust components.

The failed gasket was one of a bad batch that had entered the supply system in 1999. Corrective action to remove these gaskets should have been completed by October 1, 2003, under the requirements of Airworthiness Directive (AD) 2002-12-07. However, despite the intent of the AD and the presence of other regulatory safeguards, the incorrect gasket remained in the accident aircraft's engine. The source of the gasket and its time of installation could not be determined.

There was no engine-fire warning system on the aircraft, thus the crew would have had to rely on other system indications to determine whether a fire had ignited. Relying on secondary indicators of fire would delay the crew both in identifying a fire and reacting to it. In this occurrence, it can be assumed that the crew members were not aware of the fire when they requested the practice approach, and that they became aware just prior to declaring the emergency.



Right-engine converter plate gasket

Findings as to causes and contributing factors

1. At some point after April 1, 1999, a bad gasket (part number [P/N] LW-13388) was installed in the accident engine.
2. The requirement of AD 2002-12-07 (to ensure that old converter plate gaskets were removed and replaced by new parts) was not carried out on the accident engine.
3. The improper oil filter converter plate gasket in the right engine compartment failed, allowing pressurized oil to spray into the engine compartment and ignite on contact with hot turbo-charger and exhaust components.

4. The firewall fuel shut-off valve remained in the OPEN position, allowing pressurized fuel to be delivered to the engine-driven fuel pump by the aircraft's boost pumps.

5. The initial oil-fed fire generated considerable heat, which melted the casing of the engine-driven fuel pump, allowing pressurized fuel to intensify the fire.

6. The flames breached the main fuel tank, inboard of the engine, causing the aircraft to become engulfed in flames.

Findings as to risk

1. Inappropriate converter plate gaskets, identified by P/N LW-13388, are known to have remained in the aviation system after the date of the terminating action required by AD 2002-12-07.

2. Compliance with the full requirements of AD 2002-12-07 is not always being accomplished with respect to vibro-peening and proper gluing procedures.

Safety action taken

During the course of this investigation, Transport Canada confirmed, after consultation with the U.S. Federal Aviation Administration (FAA), that the intent of AD 2002-12-07 was to include ALL rebuilt or overhauled engines. Effectively, the intent was to broaden the Applicability section of the AD to ensure that all affected (old-style) gaskets identified by P/N LW-13388 be removed from service, purged from the system, and replaced with new gaskets identified by P/N 06B23072, in accordance with Part II or Part III of Textron Lycoming Supplement 1 to Mandatory Service Bulletin (MSB) 543A.

Transport Canada has sent a Service Difficulty Alert (AL-2005-08), dated 17 October 2005, to all owners, operators and overhaul facilities to bring to their attention the hazards identified within this report. The objective of this alert is to ensure that owners/operators and overhaul facilities of engines affected by AD 2002-12-07 have completed the following:

- complied with all the requirements stated within the AD;
- incorporated the latest issue of Lycoming MSB 543; and
- ensured that inventories of spare parts have been purged of any converter plate gaskets identified by P/N LW-13388.

TSB Final Report A05C0109—Hard Landing—Aircraft Overturned

On June 18, 2005, a float-equipped Stinson 108-1 aircraft was en route from Rock Lake, Man., to the Burntwood River seaplane base at Thompson, Man., after an overnight fishing trip. The weather for the Thompson area was below limits for day VFR operations, with gusty wind conditions. At approximately 15:30 Central Daylight Time (CDT), the pilot approached for a downwind landing and landed hard on the water surface. The aircraft bounced on initial impact, rose approximately 30 ft in the air, then nosed over on the second touchdown. The aircraft came to rest inverted and was substantially damaged. The pilot sustained fatal injuries; the passengers attempted to rescue the pilot, but were unsuccessful. The two passengers sustained minor injuries, but were able to exit the overturned aircraft and swim to shore.

Other factual information

The final approach to landing was in a direction toward the town of Thompson on a heading of about 230°, directly downwind. Landing downwind increases the speed and, consequently, the impact forces with which the aircraft contacts the landing surface. The approach airspeed was approximately 100 mph—substantially higher than the normal approach speed of 75 mph. On landing, there was no noticeable flare before water contact.

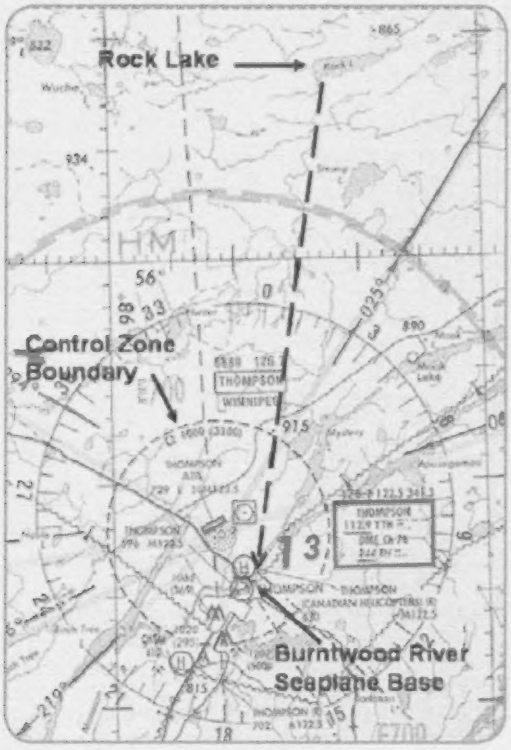
Analysis

Landing with an approach speed of about 100 mph and a tailwind of 23 mph would nearly double the aircraft's normal touchdown speed and greatly increase the impact forces on water contact. The increased impact forces would have been further amplified by the rough water conditions that existed at the time of the accident. The force sustained on this particular landing was enough to cause the float attachment fittings to fail in overload.

The aircraft was being operated without due regard for several regulations and safe practices designed for the safety of the crew, the passengers and other aircraft. The passengers were not safely seated and strapped in;

the approach was flown downwind, resulting in a high-speed, hard landing; the weather conditions were below those required for VFR operations in a control zone; the pilot's intentions were not broadcast on the mandatory frequency (MF); and ATC and the crew of an aircraft flying IFR were unaware that the accident aircraft was operating within the Thompson control zone.

The absence of witnesses, communication with ATC, and an emergency locator transmitter (ELT) signal resulted in the accident remaining undetected for nearly three hours.



Route of flight

Findings as to causes and contributing factors

1. The pilot flew the approach at high speed, with a 23 mph tailwind, and landed in rough water, resulting in a hard landing.
2. The impact forces on landing caused the float attachment fittings to fail; the aircraft's floats dug in and the aircraft overturned.

Findings as to risk

1. The required MF broadcasts were not made, creating a risk of collision between the occurrence aircraft and the IFR aircraft.
2. The aircraft was operated within a control zone in weather conditions that were below allowable limits for such operations.
3. The aircraft was operated within a control zone without the required special VFR (SVFR) clearance from ATC.
4. The pilot and front seat passenger were not wearing the available seat belts, which increased the risk of serious injury.
5. Proper seating and restraints were not provided for the rear passenger.

Other finding

1. The absence of a functioning ELT on board the aircraft and the aircraft's unknown presence within the Thompson area precluded ATC from alerting emergency services. As a result, emergency personnel did not respond to the accident.

TSB Final Report A05C0153 —Loss of Separation

On August 9, 2005, a Boeing 747-400 with 19 crew and 364 passengers, en route from Frankfurt, Germany, to Vancouver, B.C., was at FL340 on a converging track with an Airbus A340-500 with 8 crew and 204 passengers, en route from Toronto, Ont., to Hong Kong, also at FL340. The two aircraft crossed tracks at about 11:14 Mountain Daylight Time (MDT), with a spacing of 10 min between the aircraft in an area where the minimum separation for aircraft on crossing tracks at the same altitude was 15 min.

Findings as to causes and contributing factors

1. A shortage of controllers in the Edmonton, Alta., area control centre (ACC) led to scheduling practices that were detrimental to effective rest recovery. The three occurrence controllers were most likely impaired by fatigue because of the scheduling practices.
2. The controllers' fatigue was likely a factor that prevented them from detecting the errors in flight plans, and the incorrect fix reference number (FRN) and fixes.
3. The fixes and route on the flight progress strips were presented in different formats and reading sequence. This, combined with the different formats for position reports, made identification of the incorrect FRN and fixes more difficult.
4. The assignment of the "M" call sign suffix for the Boeing 747 was likely a distraction for the controllers during the flight plan setup task and subsequent position reports. This distraction reduced the controllers' ability to detect the FRN and fix errors.

5. Because there were no data accuracy crosscheck procedures specified for the flight plan activation, the controllers were more likely to rely on the normal vigilance of subsequent controllers to detect errors.

Findings as to risk

1. The lack of continuous, direct controller-pilot communications (DCPC) in procedurally controlled Canadian northern airspace results in communications delays.

2. Controller minimum off-duty periods are governed by collective agreements and the *Canada Labour Code*; they permit occasional rest periods as short as eight hours without any additional time for travel, meals, and personal hygiene. This increases the risk of controller fatigue from shortened total sleep time.

Other finding

1. The northern airspace display system situational display (NSiT) neither checks route conformance nor alerts controllers that an aircraft is following a route that has not been programmed into the NSiT.

Safety action taken

Transport Canada issued an amendment to RAC 12.7.3.3 of the *Transport Canada Aeronautical Information Manual* (TC AIM), requiring that pilots use published latitude and longitude coordinates when making position reports when compulsory reporting points have not been named.

On June 27, 2006, the Edmonton ACC issued a directive to the North High and Shield specialties that included a requirement that the controller activating the northern airspace display system (NADS) flight plan verify the fix field against the flight plan route to ensure an accurate setup.

NAV CANADA has implemented the following initiatives to alleviate North High specialty staffing issues:

- the Bison sector was reallocated to another specialty to reduce the number of sectors in the North High specialty;
- controllers have been deployed from adjacent specialties into the North High specialty to increase staff availability during peak periods;
- training within the specialty is ongoing;
- a volunteer overtime list process has been implemented so that controllers can volunteer for vacant shifts. If there are no volunteers, then overtime shifts are assigned in accordance with the NAV CANADA/Canadian Air Traffic Control Association (CATCA) collective agreement;
- a scheduling team has been developed in the North High specialty to look at future schedules and take into consideration the interests of individual controllers in the scheduling process. The scheduling process must comply with the NAV CANADA/CATCA collective agreement and *Canada Labour Code* requirements, and consider the needs of operational staff.

Since the occurrence, DCPC have been enhanced in the North High and Shield specialties as follows:

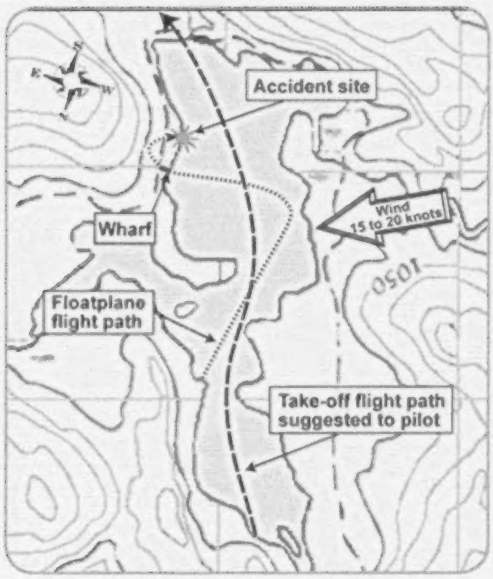
- twelve new frequencies are in operation;
- two frequencies have been upgraded to long-range frequencies;
- two new frequencies are scheduled to be operational on Baffin Island, which is in the vicinity of this occurrence, in July 2008.

NAV CANADA is presently considering re-hosting the northern airspace flight data processing system (NAFDPS) to gain certain benefits:

- flight progress strip formatting would account for pilot estimates, equipment suffixes, and only those fixes that are required for individual sectors;
- there would be a reduced co-ordination workload between existing NADS specialties and reduced training time for new controllers because it enables combining NADS specialties;
- information would be transferred from the flight plan to the system, thus reducing the risk of controller setup errors.

TSB Final Report A06Q0114—Loss of Control and Collision with Terrain

On July 8, 2006, a Cessna U206F floatplane was on a VFR flight with one pilot, one student-pilot and one passenger on board. At about 11:25 Eastern Daylight Time (EDT), the aircraft took off from Pasteur Lake, Que., and flew at low altitude over the water for a few seconds. About 30 ft above the surface of the lake, the aircraft made a 90° left turn and headed directly towards the departure wharf where the owners were. At about 100 ft above the wharf, the aircraft was seen in a nose-up attitude and appeared unstable. Shortly after, the right wing pointed towards the ground, and the aircraft pitched nose down and crashed into the trees about 300 ft farther south. A witness rushed to the crash site. Smoke was coming from the wreckage. Several minutes later, flames appeared at the right wing root. The fire could not be brought under control with a fire extinguisher, and spread to the cabin and the rest of the aircraft. The three occupants sustained fatal injuries.



Topographic map of Pasteur Lake with aircraft trajectory before the accident

Analysis

Examination of the wreckage revealed no deficiencies, engine failure or aircraft system failure. There was no indication of any emergency situation or aircraft problems before the impact. The wreckage damage is consistent with a loss of control following a stall. The aircraft stalled at about 100 feet above the ground, an altitude insufficient to effect a recovery.

The take-off flight path chosen was shorter than the usual flight path used by local pilots. Thus, the flight path for the initial climb before clearing the obstacles was shorter. As a result, at a given point, the aircraft was not as high over the obstacles as it should have been if the take-off run had been started at the far end of the lake.

After becoming airborne, the aircraft should have made a 60° left turn towards the saddle at the south end of the lake in order to be able to continue the turn over the lowest terrain. However, the floatplane did not stop its turn when it was facing the saddle; it continued to turn until it was facing the departure wharf over which it flew shortly after. In light of these facts, it is reasonable to think that the pilot flying completed this manoeuvre to fly over the wharf from which he had just departed.

The left turn put the aircraft in tailwind conditions at low altitude, which resulted in the aircraft heading towards higher terrain than if it had been flown towards the saddle. It is possible that these conditions caused the pilot flying to increase the aircraft's attitude, thereby inadvertently decreasing the aircraft's speed. The stall could thus be due to a combination of these factors, which reduced the difference between the aircraft's speed and the stall speed in conditions that were conducive to optical illusions created by drift and resulting from flying towards rising terrain.

After turning into the tailwind, the ground speed increased, reducing the aircraft's climb angle and extending the flight path for the climb. As a result, climbing performance was reduced. The floatplane flew over the wharf at a height that did not allow it to climb over the terrain. It is possible that a lack of familiarity with the area caused the pilot flying to underestimate the distances and effect of the wind on the aircraft's performance.

Findings as to causes and contributing factors

1. The flight path towards the wharf put the aircraft into a tailwind facing a mountain slope that was too high for the floatplane's climbing performance.
2. The aircraft stalled in conditions conducive to optical illusions created by drift and resulting from flying towards rising terrain; there was insufficient altitude available to effect a recovery.

TSB Final Report A06W0111—Loss of Control and Collision with Ground

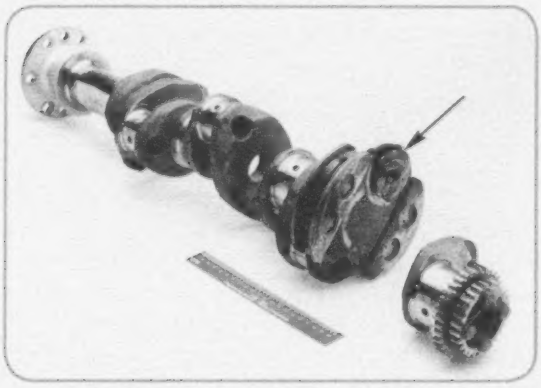
On July 11, 2006, a privately operated Piper PA-34- 200T Seneca II aircraft departed Edmonton City Centre Airport, Alta., at 11:31 Mountain Daylight Time (MDT) on a flight to Prince George, B.C. While the aircraft was in cruise flight in the vicinity of Hinton, Alta., the right engine (Teledyne Continental LTSIO-360-EB, serial number 266232-R) lost power. The pilot declared an emergency and attempted a single-engine approach and landing at the Edson, Alta., airport. On short final for Runway 25, control of the aircraft was lost and the aircraft struck an airport fence, coming to rest just short of the runway threshold. The pilot sustained serious injuries and the three passengers sustained minor injuries.

Findings as to causes and contributing factors

1. A surface crack on the crankshaft, which should have been detectable during the magnetic particle inspection (MPI) procedures, went undetected during two separate inspections.
2. The crankshaft failed from the extension, in overload, of a fatigue crack initiating from an origin subsurface to the fillet radius between the No. 1 rod journal bearing and the No. 2 crankshaft cheek, resulting in the total power loss on the right engine.
3. The pilot attempted to perform a single-engine approach in a manner similar to what he had recently practiced while flying a high-performance, military-style, single-engine jet trainer. This deviation from flight manual procedures and common single-engine approach practices for multi-engine aircraft resulted in the loss of control and impact with the ground.

Finding at to risk

1. The person responsible for maintenance (PRM), who did not have Level 2 non-destructive testing (NDT) certification, conducted the propeller strike MPI without supervision.



LTSIO-360 crankshaft fracture

Safety action taken

The overhaul facility conducted an internal quality assurance review of its NDT procedures, techniques, and equipment to ensure compliance with existing standards.

TSB Final Report A06W0139—Loss of Control and Collision with Terrain

On August 16, 2006, a Cessna 337C aircraft was operating in accordance with subpart 703 of the *Canadian Aviation Regulations* (CARs) and had departed Fort Good Hope, N.W.T., at 12:50 Mountain Daylight Time (MDT) on a VFR flight to Norman Wells, N.W.T. At 14:35 MDT, the company reported the aircraft

overdue to the Norman Wells flight service station (FSS), and radio and aerial searches were initiated. The aircraft wreckage was located at 16:16 MDT, approximately 23 NM east of Fort Good Hope. The pilot and five passengers sustained fatal injuries and the aircraft was destroyed. There was no post-impact fire.

Analysis

The weather conditions in the area of Fort Good Hope to Norman Wells and the pilot's previous experience on the recent flight to Fort Good Hope indicate that he probably encountered instrument meteorological conditions (IMC) shortly after departing Fort Good Hope. It could not be determined whether the aircraft's departure from 3 500 ft above sea level (ASL) was a result of the pilot's actions or that of external environmental elements. Before reaching 2 000 ft ASL, the aircraft entered a nose-up attitude, resulting in a loss of airspeed. The short wreckage trail, combined with the high vertical damage and flight path angle through the trees, is consistent with the aircraft being in an aerodynamic stall.

Finding as to causes and contributing factors

1. For undetermined reasons, the aircraft descended out of its en route altitude, entered an aerodynamic stall, and struck the ground.

Other findings

1. Investigators were not able to determine why the aircraft departed from controlled flight. The aircraft was not fitted with a flight-recording device. The device may have allowed investigators to reconstruct the circumstances that led to the accident.
2. The aircraft was not equipped with a terrain awareness and warning system (TAWS), nor was it required to be so equipped. That equipment could have provided additional information as to the aircraft's vertical and lateral position relative to the surrounding terrain. △

Triage Statement Guide

by Pierre-Laurent Samson, Civil Aviation Safety Inspector, Regulatory Affaires, Policy and Regulatory Services, Civil Aviation, Transport Canada

Since April 1, 2006, all federal departments wishing to amend a regulation for which they are responsible have been required to submit a Triage Questionnaire. The format of this document is set by the Treasury Board of Canada Secretariat (TBS). The document allows for the evaluation of possible repercussions that a regulatory proposal may have on 13 sectors of Canadian society (health, the environment, the economy, etc.). After receiving suggestions for modifications from analysts from various departments, the TBS replaced the Triage Questionnaire with the Triage Statement. This new document, which studies 10 sectors of Canadian society, will assist with the evaluation of the overall impact a regulatory proposal may have, and formalizes the related analysis requirements. These changes allow for more efficient use of analysts who are responsible for the analysis required for drafting supporting documents (environmental studies, cost-benefit analyses, Regulatory Impact Analysis Statements [RIAS]), and thus reduces the time required to carry through the regulatory proposal.

The following are the 10 sectors evaluated in the Triage Statement along with the justifications designating their level of impact (taken form the *Triage Statement Guide*):

1. **Public health and safety:** If a regulatory proposal is expected to have *no* impact on health or safety or is *not applicable*, it receives a No/NA rating. If a regulatory proposal is expected to have *minimal* impacts, it receives a low rating; if it is expected to have *some* impacts (e.g. reduce delays or the need for medical attention or hospitalization) it receives a medium rating; and if it is expected to have *significant* impacts (e.g. mortality), it receives a high rating.
2. **Environmental impacts:** If a regulatory proposal is expected to have *no* impact on the environment or is *not applicable*, it receives a No/NA rating. If a regulatory proposal is expected to have *minimal* impacts, it receives a low rating; if it is expected to have *some* impacts, it receives a medium rating; and if it is expected to have *significant* impacts (e.g. damaging or protecting a sensitive ecosystem from irreversible harm or damage), it receives a high rating. A *Strategic Environmental Assessment* could provide the basis for the rating, see Cabinet Directive on Environmental Assessments: www.acee-ceaa.gc.ca/016/directive_e.htm.
3. **Social impacts:** If a regulatory proposal is expected to have *no* social impacts or implications (e.g. changes to people's way of life, culture, community, political systems, well-being, personal and property rights, fears and aspirations or raises ethical concerns) or is *not applicable*, it receives a No/NA rating. If a regulatory proposal is expected to have *minimal* impacts, it receives a low rating; if it is expected to have *some* impacts, it receives a medium rating; if it is expected to have *significant* impacts, it receives a high rating. Special consideration should be given to vulnerable social and economic groups (e.g. Aboriginal, official language minorities, lower income Canadians, gender, children, the elderly, cultural groups and recent immigrants).
4. **Public security impacts:** If a regulatory proposal is expected to have *no* impacts or implications on public security (e.g. national safety and security, transportation and travel safety, criminal activity/policing, emergencies and disasters, family and home safety, financial safety, internet safety, product/consumer protection, recreational safety, school safety, bullying and workplace safety) or is *not applicable*, it receives a No/NA rating. If a regulatory proposal is expected to have *minimal* impacts, it receives a low rating; if it is expected to have *some* impacts, it receives a medium rating; and if it is expected to have *significant* impacts, it receives a high rating.
5. **Economic impacts:** If a regulatory proposal is expected to have *no* economic impacts or implications (e.g. economy, business including administrative burden and duplication, consumers, competition and internal trade) or is *not applicable*, it receives a No/NA rating. If a regulatory proposal is expected to have *minimal* economic impacts, it receives a low rating; if it is expected to have *some* impacts, it receives a medium rating; and if it is expected to have *significant* impacts, it receives a high rating.
6. **Costs and savings of the regulatory proposal:** The estimated level of gross costs or savings to government, industry, consumers, and others as a result of the regulatory proposal, in dollar terms. Estimate costs or savings in either present value (PV) terms based on at least a 10-year forecast and an 8 percent discount rate, or expressed annually, see *Canadian Cost Benefit Analysis Guide*: www.regulation.gc.ca/documents/gl-ld/analys/analys00-eng.asp.
7. **Public interest, stakeholder support and potential controversy:** If a proposal is *not* controversial and is universally supported by all stakeholder groups or is *not*

applicable, it receives a No/NA rating. If a regulatory proposal is expected to cause *minimal* controversy and is generally supported by all key stakeholder groups, including lobby groups, it receives a low rating; if it is expected to cause *some* controversy or is opposed by some key stakeholders, it receives a medium rating; and if it is expected to cause *significant* controversy, opposed by most stakeholders or faces large opposition, it receives a high rating.

8. **Impacts on regulatory coordination and cooperation:** If a regulatory proposal is expected to have *no* impact on regulatory coordination or cooperation (including between federal departments, with other governments in Canada, and internationally) or is *not applicable*, it receives a No/NA rating. If a regulatory proposal is expected to have *minimal* impacts on regulatory coordination or cooperation, it receives a low rating; if it is expected to have *some* impacts, it receives a medium rating; and if it is expected to have *significant* impacts, it receives a high rating.

9. **International trade agreements or obligations:** If a regulatory proposal is expected to have *no* impact on international trade agreements or obligations or is *not applicable*, it receives a No/NA rating. If a regulatory proposal is expected to have *minimal* impacts on international trade agreements or obligations, it receives a low rating; if it is expected to have *some* impacts, it receives a medium rating; and if it is expected to have *significant* impacts, it receives a high rating.

10. **Legal, policy/government priority, miscellaneous or other impacts:** If a regulatory proposal is expected to have *no* legal, policy or other impacts or is *not applicable*, it receives a No/NA rating. If a regulatory proposal is expected to have *minimal* legal, policy or other impacts, it receives a low rating; if it is expected to have *some* impacts, it receives a medium rating; and if it is expected to have *significant* impacts, it receives a high rating. *Miscellaneous* regulations are usually rated as No/NA.

The low impact RIAS template can be found at: www.regulation.gc.ca/documents/lit-reir/lit-reir-eng.asp. *The medium/high impact RIAS template can be found at:* www.regulation.gc.ca/documents/rias-gime/rias-gime-eng.asp. △

TC AIM Fast Facts: Fuel Requirements

The fuel requirements contained in this Section do not apply to gliders, balloons or ultra-light aeroplanes. (CAR 602.88)

In addition to VFR and IFR fuel requirements, every aircraft shall carry an amount of fuel that is sufficient to provide for

a. taxiing and foreseeable delays prior to takeoff;
b. meteorological conditions;
c. foreseeable air traffic routings and traffic delays;
d. landing at a suitable aerodrome in the event of loss of cabin pressurization or, in the case of a multi-engined aircraft, failure of any engine, at the most critical point during the flight; and
e. any other foreseeable conditions that could delay the landing of the aircraft.

VFR Flight

An aircraft operated in VFR flight shall carry an amount of fuel that is sufficient to allow the aircraft

a. in the case of an aircraft other than a helicopter,
   i. when operated during the day, to fly to the destination aerodrome and then to fly for 30 minutes at normal cruising speed, or
   ii. when operated at night, to fly to the destination aerodrome and then to fly for 45 minutes at normal cruising speed, or
b. in the case of a helicopter, to fly to the destination aerodrome and then to fly for 20 minutes at normal cruising speed.

IFR Flight

An aircraft operated in IFR flight shall carry an amount of fuel that is sufficient to allow the aircraft

a. in the case of a propeller-driven aeroplane,
   i. where an alternate aerodrome is specified in the flight plan or flight itinerary, to fly to and execute an approach and a missed approach at the destination aerodrome, to fly to and land at the alternate aerodrome, and then to fly for a period of 45 minutes, or
   ii. where an alternate aerodrome is not specified in the flight plan or flight itinerary, to fly to and execute an approach and a missed approach at the destination aerodrome and then to fly for a period of 45 minutes; or
b. in the case of a turbojet powered aeroplane or a helicopter,
   i. where an alternate aerodrome is specified in the flight plan or flight itinerary, to fly to and execute an approach and a missed approach at the destination aerodrome, to fly to and land at the alternate aerodrome, and then to fly for a period of 30 minutes, or
   ii. where an alternate aerodrome is not specified in the flight plan or flight itinerary, to fly to and execute an approach and a missed approach at the destination aerodrome and then to fly for a period of 30 minutes.

Source: Transport Canada Aeronautical Information Manual *(TC AIM) RAC 3.13*
www.tc.gc.ca/CivilAviation/publications/tp14371/RAC/3-0.htm#3-13

Tips From an Experienced AME

Here are some excerpts from a rather lengthy dissertation by an experienced aircraft maintenance engineer (AME). We think they're worth passing on. This article was previously published in Aviation Safety—Maintainer, *Issue 1/1984, and it is as relevant today as it was 25 years ago.*

1. Have a clear understanding with company management of your roles and responsibilities, and conversely, what support you require from management. Only you can answer the question "Is the aircraft ready for flight?" Your signature is accepted by all concerned as your guarantee that the aircraft is fit for flight—airworthy.
2. Ensure that all aircraft deficiencies, snags, and their rectifications are written up clearly in the appropriate logbooks. We've all heard the expression "The job isn't done until the paperwork is complete." An old cliché, but very true. Notwithstanding the legal requirement, such records are invaluable in order to recognize ongoing failure trends. They pinpoint incorrect operating procedures and are cost-effective.
3. Often pilots do not have the technical expertise to clearly define a known or suspected snag. Encourage your pilots to discuss the problem with you; if necessary, assist in the write-up.
4. Know the limits of your experience. When in doubt with a new problem, set aside your pride, and consult with one of your peers. Perhaps he's had a similar problem.
5. Be suspicious of a discrepancy that shows up a second or third time. "Ground checked and found serviceable" is, in my belief, a cop-out if it's used more than once. If the snag keeps repeating itself, the machine is trying to tell you there is a deeper and probably more severe problem.
6. Avoid returning an aircraft to service after component or accessory change that requires adjustment of controls without a local test flight. The reasons for this are obvious. While probably not a maintenance responsibility, test flights should be carried out by senior, knowledgeable pilots who have been briefed on the specific reason for the test. Whenever possible, the AME responsible for the work should go on the flight.
7. Insist on a complete library of aircraft and engine servicing manuals, associated service bulletins, airworthiness directives, etc. Memory isn't good enough. Use the manuals religiously*. One reason we tend to get away from using manuals is because the job becomes so routine—it's like counting from one to ten. However, even the best of us sometimes forget the sequence in the simplest task. Simple tasks performed frequently can be botched-up. (**Today, in 2009, manuals are available on CDs or on-line. However, the same principle applies.*)
8. Don't flatter yourself with the thought that the school taught you all you need to know for a successful maintenance career. If you want to be a successful and respected team member, education is an on-going process.
9. Don't take it for granted that rank and position keep a person from making mistakes. On the other hand, don't think that the lower the job, the less chance of serious blunders. There are plenty of cases where people performing seemingly unimportant tasks caused accidents.
10. Don't leave a job incomplete and depend on someone else to finish it without a complete briefing on what has been done and what still needs doing. Most small operations don't have the luxury of an inspection staff to give final okay to a job. In such cases, the dual inspection and certification procedure is invaluable.
11. You have undoubtedly heard it said that you can tell a maintenance worker by the way he keeps his toolbox. On a larger scale, the same applies to housekeeping in the hangar, on the flight line, and in aircraft cleanliness. A person who keeps his tools, equipment, and workplace neat works neatly and thinks neatly—and most importantly, safely.

Thank you Mr. AME. Perhaps the readers have something they would like to add. If so, let's hear from them. —Ed. △

Transport Canada Transports Canada

TP 9257

Flying single-engined helicopters far over the water can get very quiet, and shortly afterwards ...

... WET !

Roger Bacon
Flight International

Canada

Transport Canada Transports Canada

TP 2228E-6 (04/2003)

TAKE FIVE...

for safety

Five minutes reading could save a life

Low-Flying Exam

Low flying is a killer. Before you even contemplate it, try this test. It may change your mind—and save your neck.

1. How much airspeed will you lose if you slam your aircraft into a 45° bank turn?
2. What rate and radius of turn will you get in a 45° bank turn?
3. How much space will you need to do a 180° turn?
4. How much more space will you need with a 20 kt wind behind you half way round the turn?
5. How far away can you see a wire?
6. If you have to jerk back on the stick to miss a wire, how much space will it take to change the flight path upwards?
7. If you have to pull up quickly straight ahead, what airspeed will you have after 300 ft of climb?
8. What do you do if you run a tank dry at low altitude?
9. Will your windshield withstand hitting a 3-lb gull?

Do you still want to try some low flying?

Canada